the OIL AND GAS JOURNAL

BJ engineering puts power to work for you...

TYPE B POWER SLIPS
smooth pipe handling
on round trips

THE BJ TYPE B POWER SLIP is another important BJ power development made to cut your drilling costs. Here's why—

FAST! Slips are pressure raised *and pressure set* at the touch of a foot pedal . . . pipe is pressure centered . . . slip ring floats free when making up or breaking out with the table . . . the entire BJ Power Slip swings in or out of operating position in a matter of seconds.

COMPACT! A single husky pressure cylinder raises and lowers slips instantly . . . offset arm construction increases work room . . . unitized slips are quickly changed for different drill pipe and casing sizes.

SAFE! When BJ slips are set, arm ring clears top of rotary table by several inches – an important safety point. Rugged BJ construction insures ample strength for the heaviest pipe strings.

VERSATILE! The Type B handles 2⅜" to 7" drill pipe or casing by simply changing slips. *It can be unitized with any rotary . . . is installed without substructure changes.*

See your nearby BJ Representative who has all the facts on the Type B Power Slip. Write for Bulletin 450 describing the Type B Slip in full detail.

BJ MEANS ENGINEERED OIL TOOLS

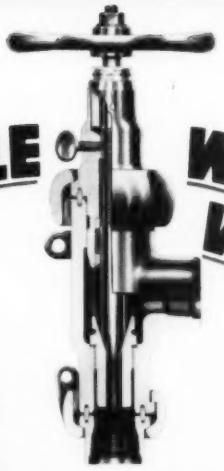
Byron Jackson Co.

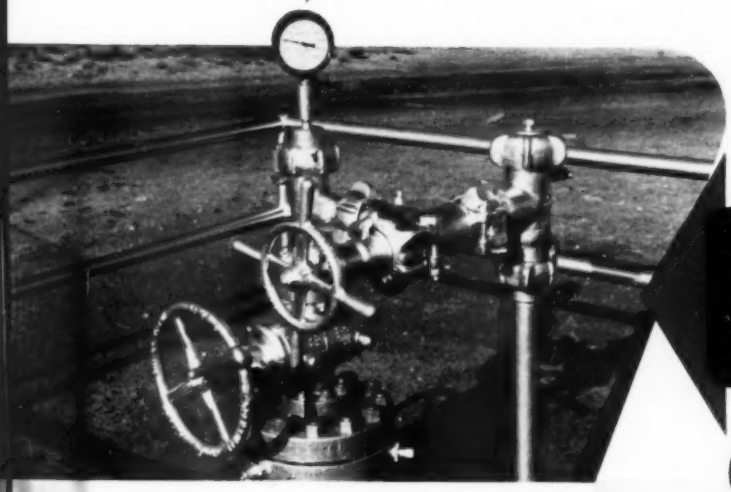
MAIN OFFICE & PLANT: LOS ANGELES 54, CALIF.

PRICE 50 CENTS TABLE OF CONTENTS PAGE 53 MAY 31, 1951

ON HIGH PRESSURES OR LOW, PRODUCTION FROM ANY WELL CAN BE BETTER CONTROLLED WITH

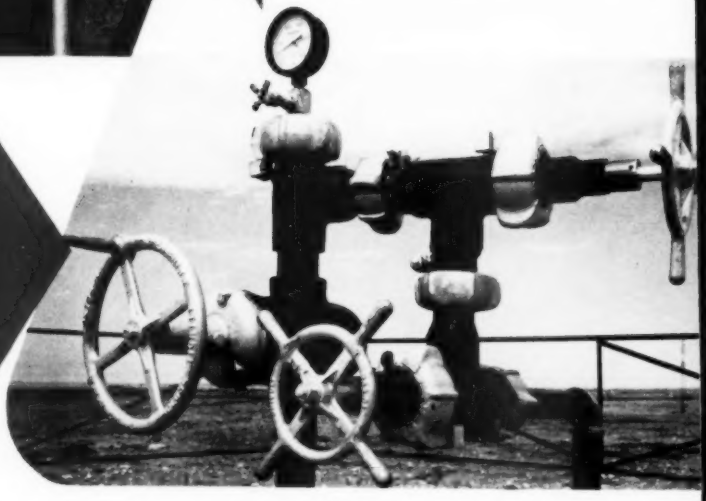
The new UNIBOLT ADJUSTABLE WING VALVE





On high pressure wells, IT'S A DEPENDABLE, LOW COST WING VALVE

On low pressure wells, IT'S A PRECISE, TROUBLE-FREE, ADJUSTABLE CHOKE



The UNIBOLT Wing Valve, designed originally for use as an adjustable choke where well conditions did not demand a positive choke, has become popular with production men as a dependable valve for numerous services where a positive shut-off is essential. Christmas trees for both producing and injection wells, high pressure oil and gas separator manifolds, heater manifolds, meter runs and similar services are made to order for this dependable, yet relatively low-cost, valve. Since high pressure wells are usually produced through a small positive choke, the one-inch opening provided in the UNIBOLT Wing Valve when in full open position is ample to assure unrestricted flow. An additional advantage is the replaceable stem and seat, which may be changed in the field, easily and at low cost. A recent refinement in its mechanical design is the stem packing which, after the valve is assembled at the factory, never requires adjustment or tightening.

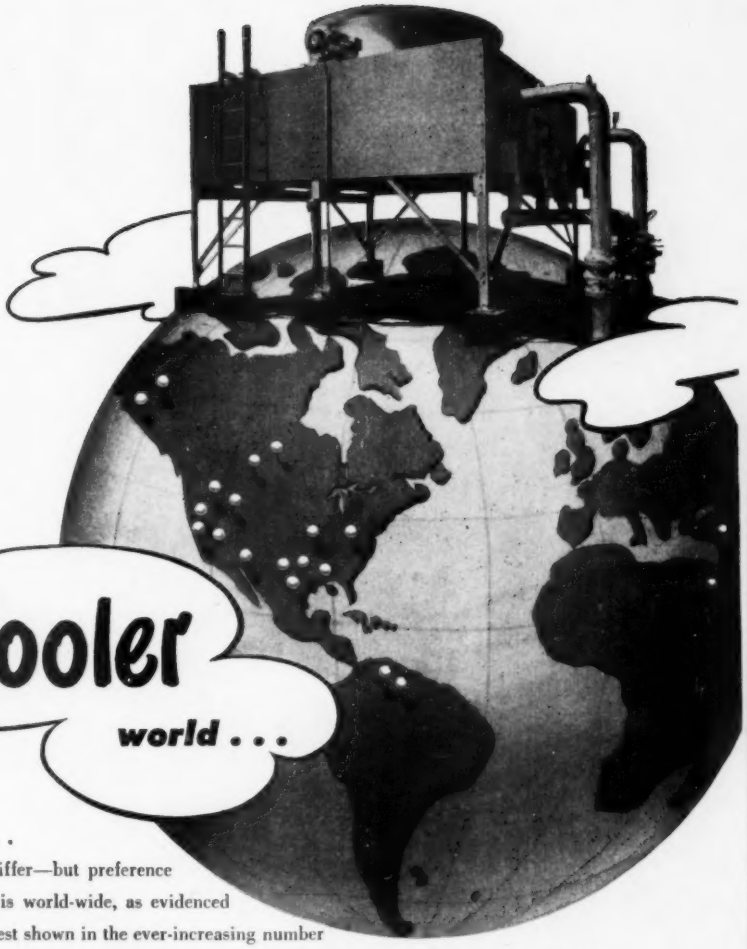
Having standard UNIBOLT Couplings between its component parts, the UNIBOLT Wing Valve is easily dismantled or assembled, and may be readily converted to a Positive Choke Body by substituting a blanking plug and positive bean for the stem and seat assembly.

Available in 6,000, 10,000 and 15,000 lbs. test, and in corrosion resistant alloy.

THORNHILL-CRAVER COMPANY

HOUSTON TEXAS

from Arizona to Arabia



it's a DriCooler world . . .

Climates vary . . . cooling requirements differ—but preference for Marley DriCoolers is world-wide, as evidenced by the exceptional interest shown in the ever-increasing number of DriCooler installations throughout the world. Consider all factors — weather conditions, fluid to be cooled, horsepower required, influence of corrosion, and many more — and you'll find that Marley offers you the best, most economical dry cooler for your specific job.

This is so because Marley makes a *complete* line of DriCoolers in a wide range of capacities and designs; because each Marley DriCooler is *engineered for the job*, whether it be to cool jacket water in the Arctic or lube oils in the burning desert.

There's a Marley application engineer in every major city, whose services and experience are yours for the asking. Call your Marley man for full details or write for Bulletin DC-50.

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KANSAS CITY 15, KANSAS

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

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for Better Pumping!

This easy-starting Fairbanks-Morse "ZC" Engine gets your pumping rig off to a good start . . . *even on the coldest mornings.* Fairbanks-Morse High Tension Magneto supplies a "hot" spark that eliminates costly starting delays. There are no complicated parts in a "ZC" . . . no delicate adjustments to cause trouble. Maintenance is simplified, and costs are exceptionally low. Stop in at your supply store and see the Fairbanks-Morse "ZC" . . . the economical answer to any pumping problem. Fairbanks, Morse & Co., Chicago 5, Illinois.

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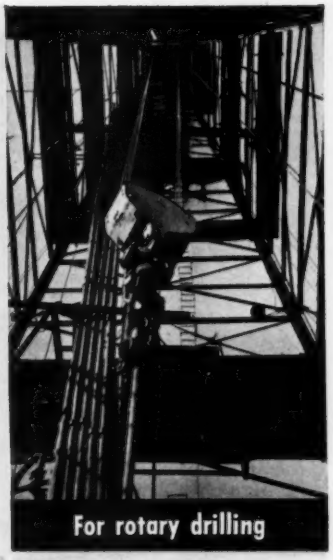
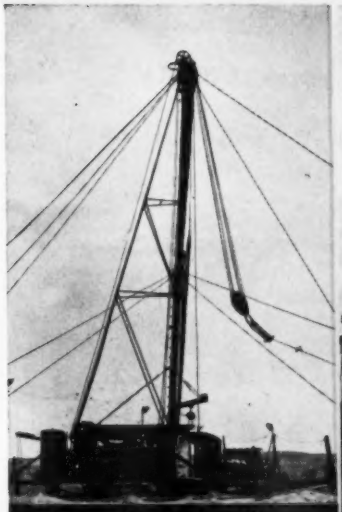
For **better** service and **more** economy

Order from a thousand and one

MACWHYTE WIRE ROPES



For rotary drilling



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You'll get maximum service from wire rope that has been specially designed for a special job. Over the years, ropes for all types of equipment in every field have been developed by Macwhyte. It will pay you to get Macwhyte Wire Rope that has been job-proved and engineered for your particular equipment. Recommendations are promptly available from Macwhyte distributors or Macwhyte Company.

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Choose an FWD and you choose More than a Truck

YOU GET EQUIPMENT THAT CAN KEEP A SCHEDULE

"Rough going or soft bottom, FWD extra traction gets us where we want to go—and *safely*, whether the haul is over-the-highway or off-the-road—we'd rather drive an FWD."

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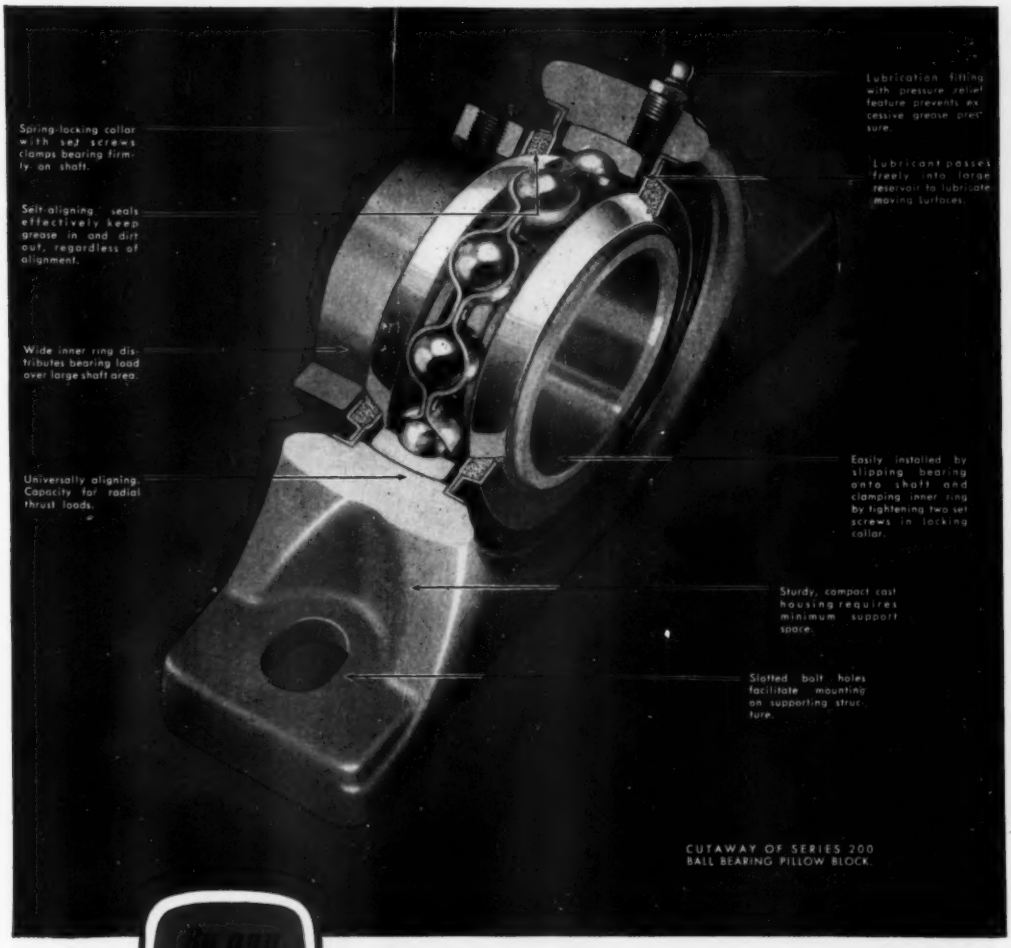
FOR GEOPHYSICAL WORK

You'll find that the new LD (light duty—14,500 lb. GVW) provides a firm safe mounting for drill rigs and geophysical instruments. It's a powerful, sure-to-get-there truck for hauling water or explosives, too. Ask for "The Story of the LD" plus facts on the complete FWD line. THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis. Canadian factory — Kitchener, Ont. *World-wide Sales and Service.*

America's Foremost Heavy-Duty Truck

LINK-BELT Ball and Roller Bearings smooth the path of power


Spring-locking collar with set screws clamps bearing firmly on shaft.
Self-aligning seals effectively keep grease in and dirt out, regardless of alignment.
Wide inner ring distributes bearing load over large shaft area.
Universally aligning. Capacity for radial thrust loads.
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Sturdy, compact cast housing requires minimum support space.
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By any standard . . .

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process design to operating plant.

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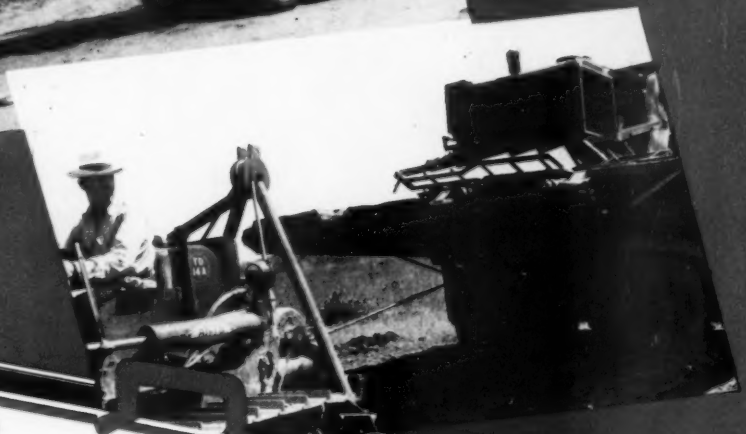
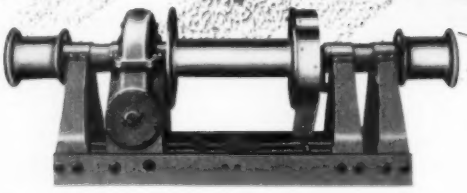
PLUG VALVES

Want literature? Ask for Catalog 4-OG, American Car and Foundry Company, Valve Division, 1501 East Ferry Avenue, Detroit 11.



Indispensable TOOLS



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Republic Electric Weld Line Pipe offers uniform roundness, diameter and wall thickness . . . uniformly high yield strength . . . uniformly straight, long lengths . . . ease of bending and welding . . . freedom from scale . . . inside and out inspection. That's why more than 59,000 miles of this modern pipe have gone into transmission, distribution, collecting and product lines during the past 22 years. Write for literature.

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Republic Electric Weld Line Pipe is made from flat-rolled steel, both sides of which are inspected. Thus, the surface which becomes the inside wall is free from hidden defects.

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Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

Make H_2SO_4 from H_2S

WITH A CHEMICO PLANT

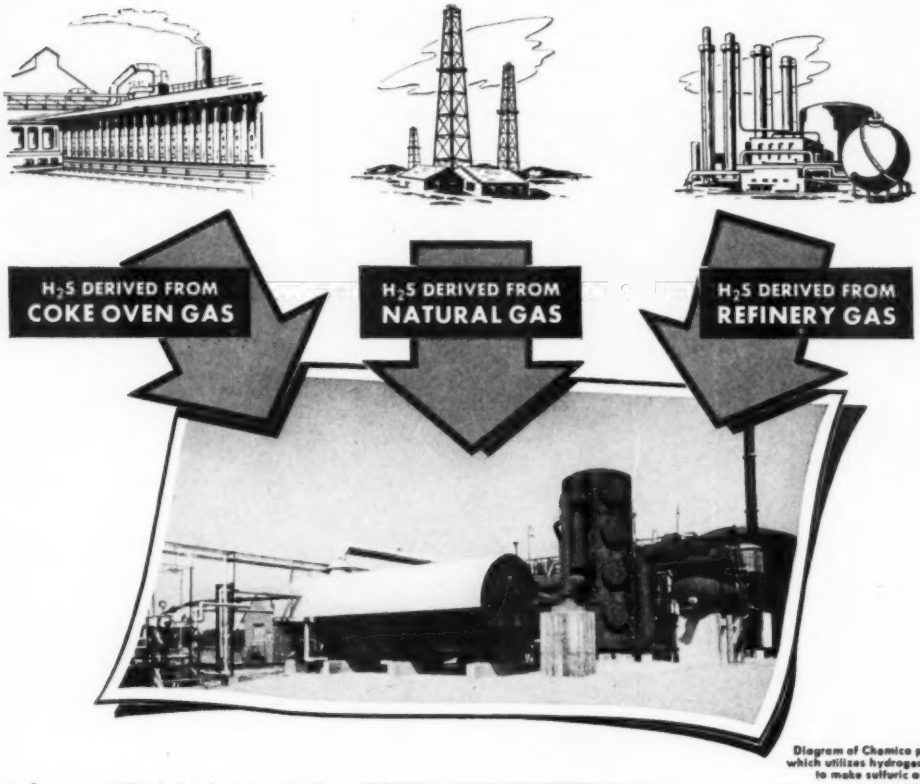
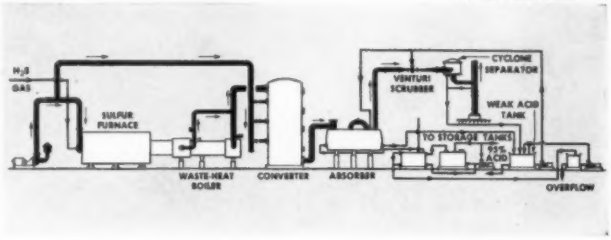


Diagram of Chemico process which utilizes hydrogen sulfide to make sulfuric acid.

Now that raw sulfur is in short supply, it has become necessary to manufacture sulfuric acid from other raw materials such as hydrogen sulfide. If you have hydrogen sulfide available, it will pay you to investigate Chemico's practical and proven process for making H_2SO_4 from H_2S. Chemico's new type sulfuric acid plant is especially well suited for this purpose. Or existing sulfuric acid plants can be converted.



CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

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EUROPEAN TECHNICAL REPRESENTATIVE: CYANAMID PRODUCTS, LTD., LONDON W. C. 2, ENGLAND
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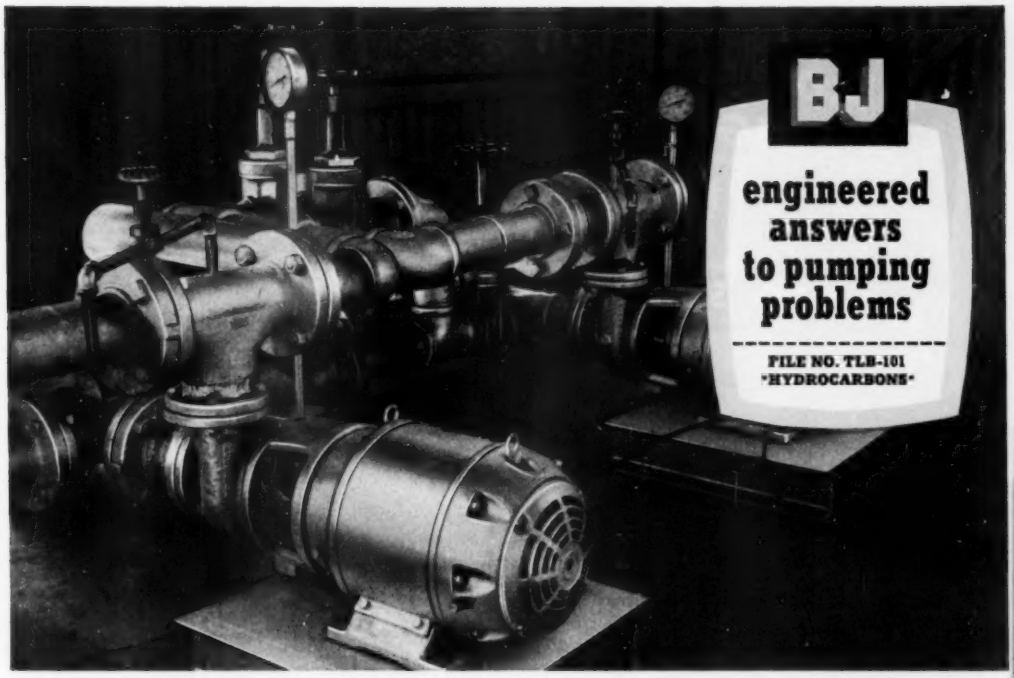
CC219

Chemico plants are profitable investments



General Petroleum reports:

Mechanically-sealed BJ Type TLB Pumps handle hydrocarbons without leakage, fire hazard, repacking problems or special operating attention

BYRON JACKSON ENGINEERS developed the TLB pump to solve the leakage, fire hazard and repacking problems faced in the handling of hydrocarbons. Formerly, the only pumps which met these requirements represented a considerable investment in cost and installation. Now, the BJ Type TLB offers a sensibly-priced unit, easily installed and operated with a minimum of attention. It features a simple, efficient BJ Mechanical Seal which replaces the packing in the stuffingbox and provides a reliable safeguard against leakage.

The installation shown above is at General Petroleum's Bakersfield Bulk Plant. Two BJ Type TLB Pumps are used here for loading gasoline and diesel fuels, pumping 160 gpm against 62 ft. total head. Explosion-proof 3 hp, 3-phase, 60 cycle, 220/440 v motors operate at 3550 rpm.

For the engineered answer to *your* standard or special pumping needs contact your local BJ sales office or write direct. For more information on these TLB Pumps—including pump selection table and friction compensation charts—send the coupon below.

FILE FACTS:

- Unitized design simplifies installation—needs no base plate—saves space—mounts at any angle.
- No packing to maintain.
- BJ Mechanical Seal cooled by pumped liquid.
- Single-stage, single-suction pump sizes from 1¼" to 4".
- Close-coupled construction allows more efficient application of power to pump.
- Capacities to 1000 gpm. Heads to 200 ft.
- Discharge pressure: 75 psi.
- Max. working temperatures: 150°F.
- Explosion-proof motors.

Byron Jackson Co.
Since 1872
P.O. Box 2017, Terminal Annex, Los Angeles 54, Calif.
Offices in principal cities

PUMP DIVISION, Dept. 28
Please send me your TLB Bulletin No. 50-9200

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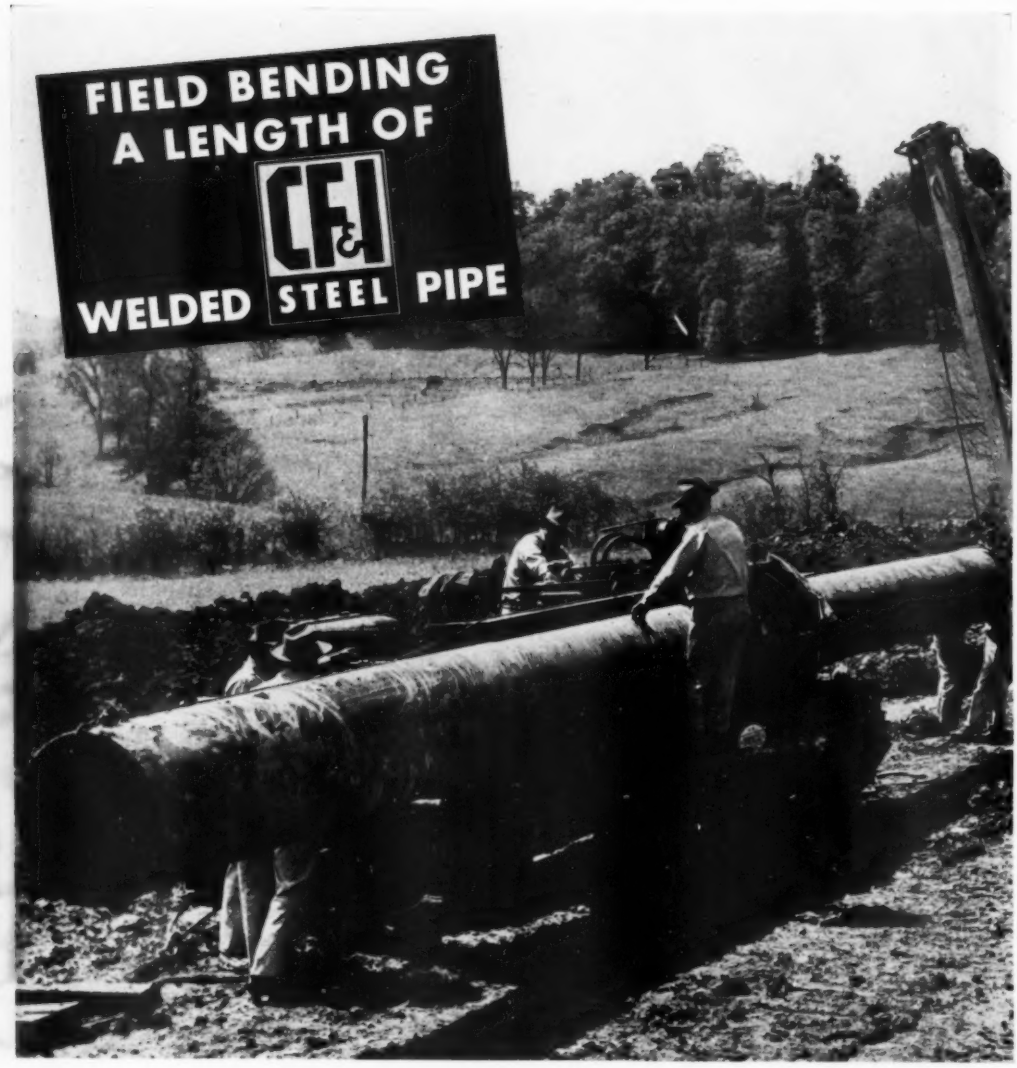

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Because CF & I Welded Steel Pipe is made from high tensile strength carbon-silicon steel plates with low carbon and manganese content, it bends more easily . . . field-welds faster and more uniformly.

And, CF & I Welded Steel Pipe is better, too, because the high quality plate from which it is made, is produced entirely within our own plant.

CF & I Welded Steel Pipe is available in 40' lengths and 24" through 36" O.D. Write for details.

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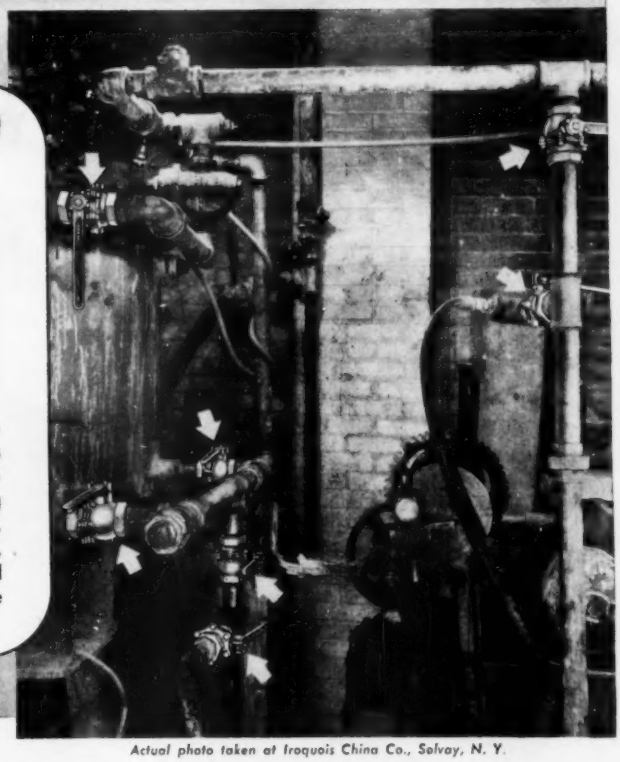
a subsidiary of CF&I—THE COLORADO FUEL & IRON CORPORATION

Highly Abrasive Materials

are no threat to ROCKWOOD Ball VALVES

Foreman at Iroquois China Company, Solvay, New York, says "Rockwood Ball Valves are operated 40 times a day handling a mixture of clay and water. Each Valve has performed better, operated easier and lasted longer than any other valve we ever used."



Actual photo taken at Iroquois China Co., Solvay, N. Y.

• LEAK PROOF SERVICE • FULL ROUND FLOW
• EASY TO OPERATE • NO MAINTENANCE

The Rockwood Ball Valves shown in this picture are installed on a slip machine and lines. They are operated 40 times daily and handle a mixture of clay and water. This mixture, called "slip", is highly abrasive. Yet, under this severe condition, Rockwood Ball Valves have been in operation for over 14 months — longer than any other valves ever used — and during that time, have never required attention. Men using the Rockwood valves claim they operate easier and faster and a glance tells whether valves are opened or closed.

When using the conventional type valve, the Iroquois China Company found the turbulence created in the valve would add air to the "slip" and cause pin holes in the finished product. Also, the "slip" would accumulate in the bonnet and prevent full opening and tight closing. Rockwood Ball Valves eliminate this trouble. Rockwood Ball Valves are also successfully performing on glaze operations, where a mixture of ground glass and water is used.

The full *round* opening of the Rockwood Valves do not permit turbulence. Design of the resilient synthetic rubber seat in combination with the hard chromium floating ball makes Rockwood Ball Valves stay tight when closed.

A valve with these qualities will give top notch performance in your plant — why not install one today and be convinced.

Rockwood valves are recommended for 300 p.s.i. working pressure and are available in all pipe sizes from ½" to 4". They are today giving service in oil refineries, food, paper, textiles, chemical and rubber plants, etc.

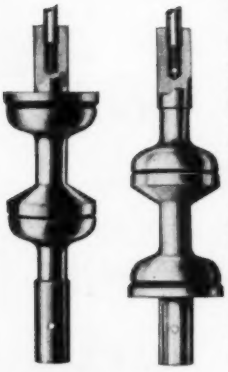
Distributors in all principal cities.

ROCKWOOD SPRINKLER CO
104 HARLOW STREET WORCESTER 5, MASS

COMPARE

THIS FEATURE

OF THE HONEYWELL SERIES "700" VALVE



VERSATILITY

Design of plugs and bodies permits easy reversing in field. Simply invert body and plug and reattach. No extra parts or complicated adjustments required. Valve travel indicator plate is etched on both sides and need only be turned over when inner valve action is reversed.

Specially Designed Neoprene Diaphragm

Duplex Upper Stem Guide

Packless Bellows Seal

Safety Stem Lubricator

One-Piece Bonnet

Wide Variety of Discs

✻ Compare the Versatility of this valve with that of any other wide band proportional type . . . for instance, the easy reversibility of the plugs in the field.

Then check the other features of the valve . . . the Specially Designed Diaphragm, the Duplex Stem Guide, the One-Piece Bonnet, the Packless Bellows Seal, the Safety Stem Lubricator, the wide variety of discs to meet the most exacting process requirements.

Your comparison will prove that the Honeywell Series 700 has *all* of the features you look for in a fine valve.

It's available in a wide range of styles and sizes. For detailed information, write for a copy of Bulletin 700-2 or call in your local Honeywell engineer . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1906 Windrim Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

New Bulletin 750, "Control Valve Sizing Data" is now available

MINNEAPOLIS **Honeywell**

VALVE PRODUCTS

GLOBE

GLOBE TUBES

***Specialization* Gives You Uniform High Quality In**

STAINLESS STEEL TUBES

GLOBE ***Seamless***

GLOWELD ***Welded***

- **Ease of Fabrication**
- **Resistance to Corrosion and Oxidation**
- **Strength at High Temperatures**

Globe engineers gladly give you the benefit of specialized knowledge of stainless steel tubing in a wide range of services and applications — to improve your product — to cut costs.

GLOBE produces 26 standard analyses of stainless steel tubes —also special analyses when required.

Globe seamless stainless steel tubing may be had in sizes from ⅛ inch to 6⅝ inches O. D., and in pipe sizes ⅛ inch to 6 inches, standard, extra strong and double extra strong weights.

Gloweld electric welded stainless steel tubing may be had in sizes ranging from ¼ inch to 5 inches O. D. inclusive; in standard weight pipe (schedule 40) sizes ⅛ inch to 2 inches—lightweight pipe (schedule 5 and 10) ⅛ to 4½ inches inclusive.

Globe Steel Tubes Co., Milwaukee 46, Wisconsin

Chicago • Cleveland • Detroit • New York • Philadelphia • St. Louis
Houston • Denver • San Francisco • Glendale, Cal.

TYPICAL ANALYSES

301, 302, 302B, 304, 308, 309, 309S, 309Cb, 310, 314, 316, 316Cb, 317, 321, 329, 330, 347, 403, 405, 410, 416, 430, 443, 446
Inconel* Nichrome**

** Registered U. S. Trade-Mark.*
*** Trade-Mark Reg. U. S. Pat. Off.-D-H Co.*

Write for bulletin 333 — Corrosion and Heat Resisting Steel Analyses Chart — a valuable reference tabulation of stainless steel analyses as produced by various manufacturers.

Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — carbon — seamless steel tubes — Globeiron seamless high purity ingot iron tubes — Globe Welding Fittings.

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When the job gets rough in the field, it's good to know there's a supply store with top-notch service, supplies and technical advice as near as your phone.

SUPERIOR covers the mid-continent oil area *to serve you in a hurry!* Each SUPERIOR store has a complete line of oil, gas, and industrial supplies, pipe and machinery. When you need "on-the-spot" supplies and service, call your SUPERIOR store.

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SUPERIOR'S machine shop and fabrication plant in Shreveport, Louisiana, can mean efficiency and profits on piping jobs of the oil, gas, chemical and power industries. Write for SUPERIOR'S booklet, "Save Time and Money." Learn how the "Superior method" of prefabrication can mean profits to you!

SUPERIOR IRON WORKS & SUPPLY COMPANY, INC.

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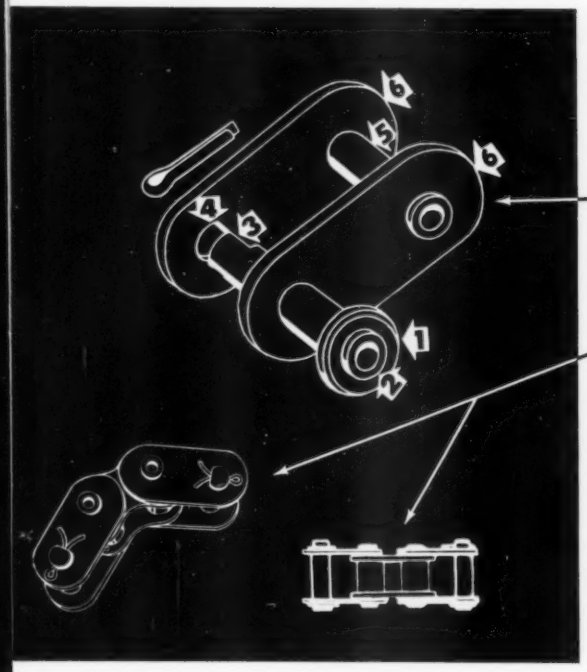
NEW YORK CITY — TELEPHONE OREGON 9-3650

BALDWIN-REX "BA" ASSEMBLY MEANS . . .

EASY REPAIR . . .

EASY ADJUSTMENT



Baldwin-Rex "BA" Assembly Riveted Oil Field Roller Chains make possible the quickest, easiest field chain adjustments and repairs you've ever known.

The secret of the Baldwin-Rex "BA" Assembly is the Single Pin Connector Link. A washer (1) is spun over the head of the connector pin (2). The milled flat (3) at the cottered end of the pin fits into a special hole in the side plate (4). This combination holds the pin firmly in place, yet it's easy to remove because it's a "sliding fit" through the entire link except for the milled flat end. When the pin is removed, the riveted pin at the other end of the link (5) holds the side plates (6) firmly in place.

Here's your insurance against excessive loss of drilling time—"BA" 3-Pitch repair units. You can stock them in the doghouse—have them ready for instant use when you need them.

This unit consists of a standard roller link and two single pin connector links. If a link becomes damaged while in service, it can quickly be replaced right on the job by inserting one or more repair units. What's more, these "BA" repair units are interchangeable with any standard roller chain.

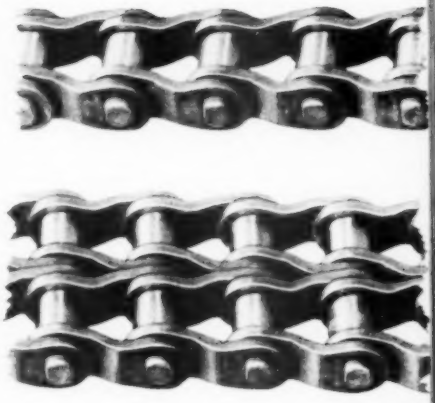
Remember, with the "BA" Assembly you get the longer life and greater strength of riveted chain with the greatest ease of assembly and disassembly yet devised, and in single strand, at even lower cost than with old style detachable chain.

Our Bulletin 49-29 has all the facts on "BA" Assembly as well as Rex A.P.I. Chains and Rex Oil Field Chains. Write for it today or ask for it at your local supply store. Chain Belt Company 1619 W. Bruce Street, Milwaukee 4, Wis.

BALDWIN·REX
ROLLER CHAINS

FOR DRAW WORKS DRIVES

...REX 3125 CHAIN



REX 3125 CHAIN is especially designed for high speeds and high strength required of draw works chain drives. With its relatively short pitch—3⅛"—Rex 3125 Chain can operate at far higher speed than longer pitch chain, yet it has far greater load-handling capacity and shock resistant qualities than any other draw works chain.

These chains have unusually high ultimate strength —115,000 lbs. in single strand and 230,000 in double strand. They are built of highest quality alloy steels with all pins, bushings, rollers and side bars accurately heat treated in the most modern furnaces to develop maximum strength and resistance to wear.

Don't gamble with your draw works drives. Be sure to specify Rex 3125. Your Rex Field Sales Engineer or your local supply store will be glad to show you how Rex 3125 will give you lower costs per foot of hole drilled.

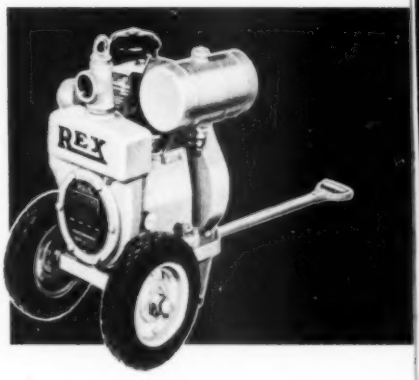
CHAIN BELT REX COMPANY

NOW! A REAL

OIL FIELD UTILITY PUMP

The Rex self-priming utility pump is thoroughly field-tested and field-proved. 5 *outstanding features* make it the pump you can't afford to be without.

- *Simplest Pump Yet Designed.*
- *All Wearing and Moving Parts Accessible* with removal of one cover plate.
- Highly Portable . . . light weight yet sturdy construction.
- *Simplest, Most Positive, Leakproof Seal* ever designed.
- *The Only Pump which Maintains "New Pump" Efficiency its Entire Life.* The *exclusive,* patented Rex Adjustable Air Peeler does the trick.



Rex Oil Field Sales Offices Are Located in the Following Cities:
NEW YORK • TULSA • DALLAS • HOUSTON • MIDLAND • LOS ANGELES

CHAIN BELT COMPANY

BALDWIN-DUCKWORTH DIVISION
Springfield 2, Mass.

REX CHAIN & TRANSMISSION DIVISION
Milwaukee 4, Wis.

REX CONSTRUCTION MACHINERY DIVISION
Milwaukee 4, Wis.

Bingham

PRECISION BUILT FIELD PROVEN PUMPS

"Double Volute"

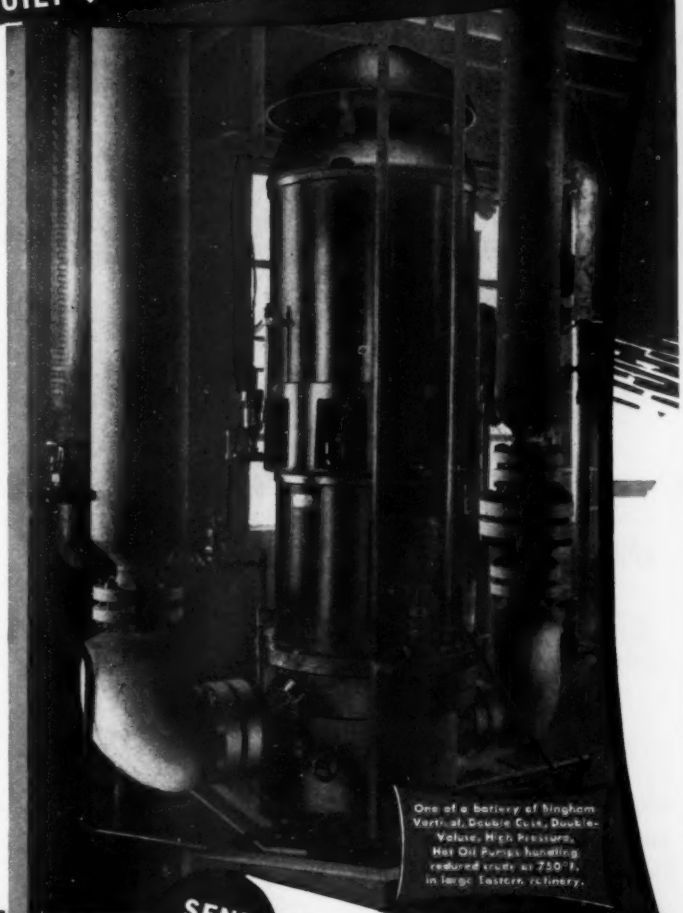
DOUBLE CASE VERTICAL PUMPS

Bingham Vertical Double Case Refinery Pumps are of "Double-Volute" design, insuring perfect radial balance of the rotating element — eliminating seizure and wear between rotating and stationary parts and reducing stuffingbox maintenance to a minimum.

A salient feature in Bingham "Double-Volute" pumps is "TWO NOZZLE" discharge from the inner case into the outer case—the nozzles being located 180° apart. For hot service, this feature provides adequate circulation of pumpage, insuring a uniform temperature rise of all parts, particularly the outer case. *Distortion due to temperature changes is eliminated.*

• • •

Bingham Vertical Double Case Refinery Pumps, like all Bingham products, are precision built in our new and modern plant. Each part is subjected to rigid inspection by expert craftsmen.



One of a battery of Bingham Vertical, Double Case, Double-Volute, High Pressure, Hot Oil Pumps handling reduced crude at 750°F. in large Eastern refinery.

SEND NOW FOR "DOUBLE VOLUTE" treatise describing the principle and advantages of Bingham "Double Volute" pumps.

Bingham — DOUBLE VOLUTE RADIAL BALANCE — PUMPS SINCE 1921

GENERAL OFFICES:
705 S.E. Main Street
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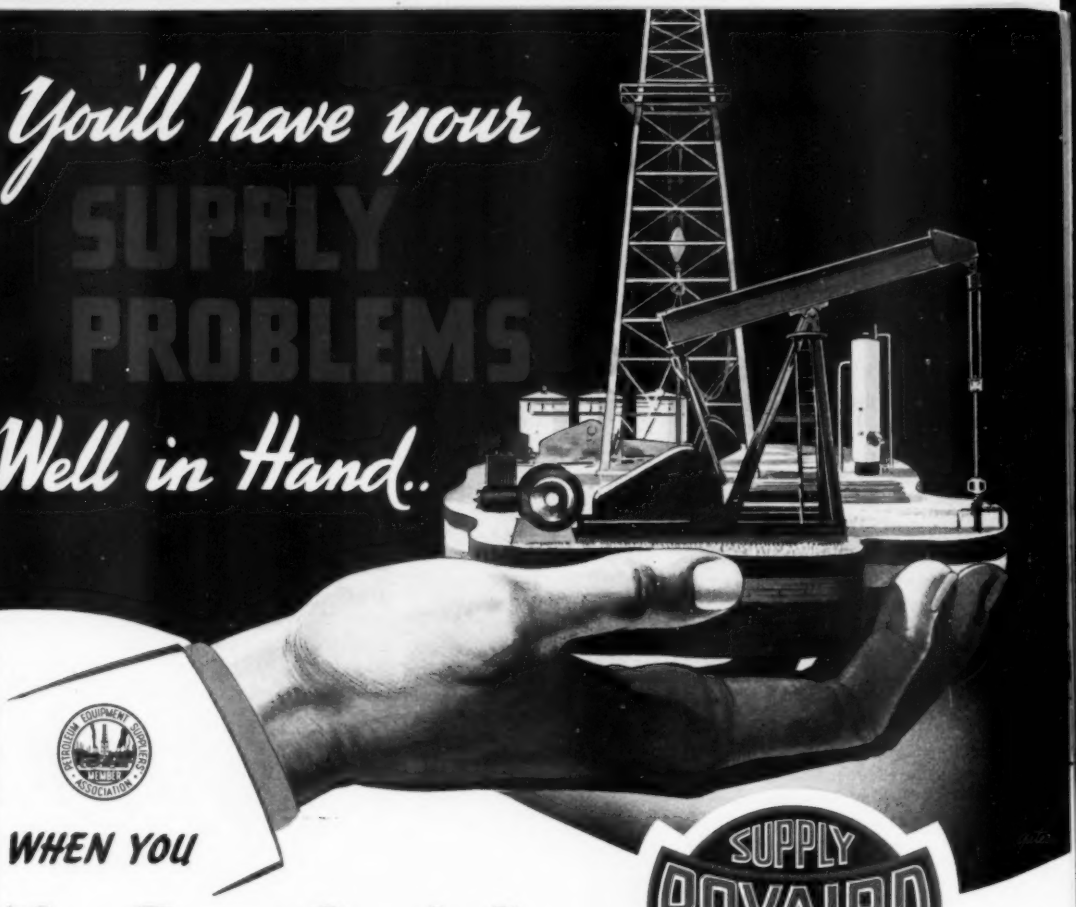
You'll have your SUPPLY PROBLEMS Well in Hand..



PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

WHEN YOU "Buy From Bovaird"

At your friendly Bovaird Supply Store, you will find an experienced staff capable of helping you with your supply needs. To serve you and assure you of a dependable source of supply for nationally known brands has always been our objective. There are 22 Bovaird Supply Stores and Offices strategically located in the Mid-Continent Area, well stocked and at your service.

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THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
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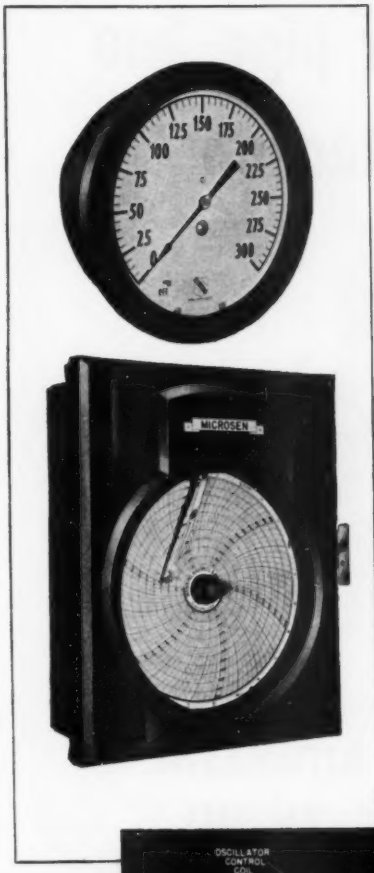
80 YEARS OF PROGRESS WITH THE OIL INDUSTRY



FACTS ABOUT THE NEW *Microsen*

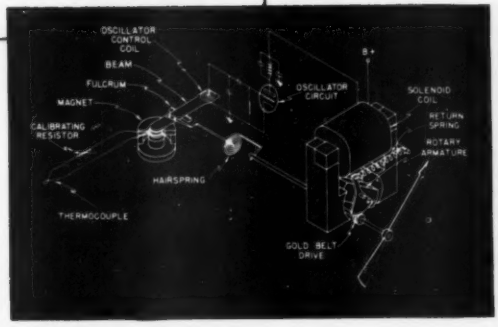
TEMPERATURE MEASURING INSTRUMENTS

Conventional industrial temperature measuring devices, like millivolt pyrometers and potentiometers, are often too fragile, complicated or costly for many applications.

Microsen Temperature Indicators and Recorders have none of these disadvantages, whatever the demands of service. They are rugged, simply constructed, economical – yet measure temperature precisely between –100° and + 3000°F.

Heart of the instrument is the power-actuated Microsen Balance, a unit extremely sensitive to low power input–insensitive to line voltage variations. Both dials and charts are readily calibrated to thermocouple temperature scales. Thermocouple cold junction compensation is achieved–regardless of ambient temperature effects–by a built-in, thermostatically-controlled and insulated heater. A sealed housing protects all measuring elements from dust and corrosive vapors.

The high torque rotary solenoid, which drives the pointer, makes the instrument especially suitable for round dial indication, thus reducing the opportunity for parallax error. It also assures "pin point" accuracy in positioning the pointer, and permits the use of dials as large as 12 inches.



HOW MICROSEN INDICATORS AND RECORDERS MEASURE TEMPERATURE

The Microsen Balance maintains equilibrium between two forces. One is proportional to thermocouple input, the other to the mechanical position of the instrument pointer.

Any change in thermocouple input deflects the Microsen beam and changes the proximity of the beam's flag end to the oscillator coil. The oscillator circuit then detunes and creates a current change through the vacuum tube and solenoid coil.

As the solenoid armature rotates, it positions the pointer so that the hairspring torque is opposed and equal to the input torque. The mechanical indication is thus weighed in exact proportion to thermocouple input. Consequently, the pointer accurately indicates the temperature on the dial.

MICROSEN BULLETIN 404 contains details about these revolutionary new temperature measuring instruments. Also included is information about Microsen Electric Indicators and Recorders for other fields of measurement. Write for a copy.

MICROSEN ELECTRICAL INSTRUMENTS

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'MICROSEN' ELECTRICAL AND 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

When planning your pipe line ... plan for protection

Bitumastic 70-B Enamel being machine-applied to a 20-inch gas transmission line.

PIPE-LINE engineers are proud of their completed pipe-line projects. They are the result of careful planning, expert engineering skill and plenty of hard work. And these projects deserve the best possible protection against corrosion — the protection provided by Bitumastic Enamels.

"The best possible protection against corrosion"— this claim is based on actual service records . . . on *proved* performance. Many pipe lines are still carrying gas and oil underground, after more than 30 years good service. And these durable enamels have established these records under the most severe corrosive conditions.

Further, the experience gained by Koppers in safe-guarding thousands of miles of pipe lines against corrosion is available to you. Discuss your next pipe-line project with one of our representatives. He will give you complete details concerning Bitumastic Enamels.

Specify BITUMASTIC® ENAMEL

Bitumastic Enamels soon available from Koppers new California Plant!

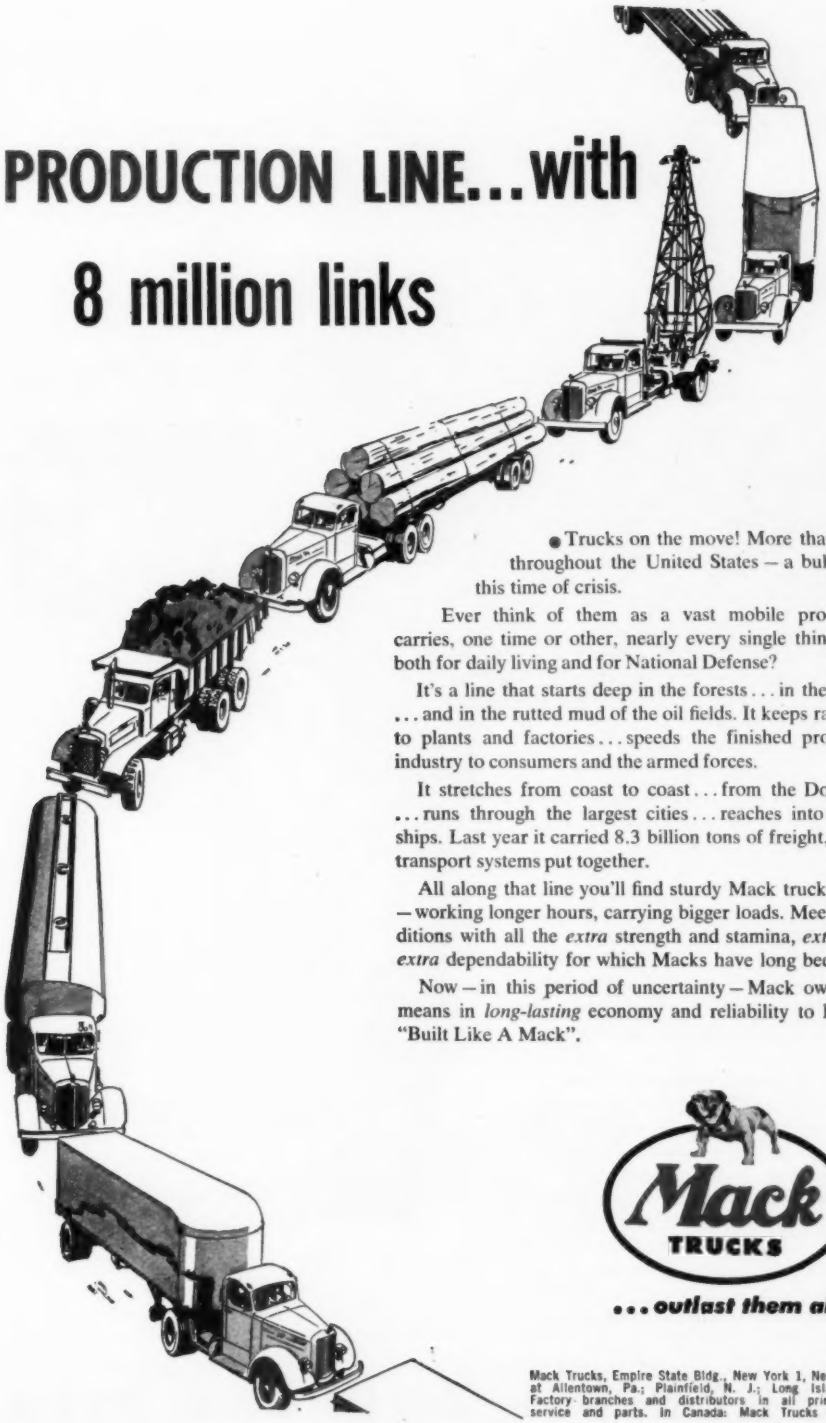
As soon as present construction work is completed, Koppers will be able to supply Bitumastic Enamels from a new plant at Fontana, California. The plant is being built to give you better service in the west.

KOPPERS **BITUMASTIC** ENAMELS

REG. U.S. PAT. OFF.

KOPPERS COMPANY, INC., Tar Products Division, Dept. 503-T Pittsburgh 19, Pa.

PRODUCTION LINE...with 8 million links



● Trucks on the move! More than 8 million of them throughout the United States – a bulwark of security in this time of crisis.

Ever think of them as a vast mobile production line which carries, one time or other, nearly every single thing we need and use, both for daily living and for National Defense?

It's a line that starts deep in the forests... in the mines and quarries ... and in the rutted mud of the oil fields. It keeps raw materials flowing to plants and factories... speeds the finished products of American industry to consumers and the armed forces.

It stretches from coast to coast... from the Dominion to the Gulf ... runs through the largest cities... reaches into the smallest townships. Last year it carried 8.3 billion tons of freight, more than all other transport systems put together.

All along that line you'll find sturdy Mack trucks doing double duty – working longer hours, carrying bigger loads. Meeting emergency conditions with all the *extra* strength and stamina, *extra* performance and *extra* dependability for which Macks have long been famous.

Now – in this period of uncertainty – Mack owners realize what it means in *long-lasting* economy and reliability to have trucks that are "Built Like A Mack".

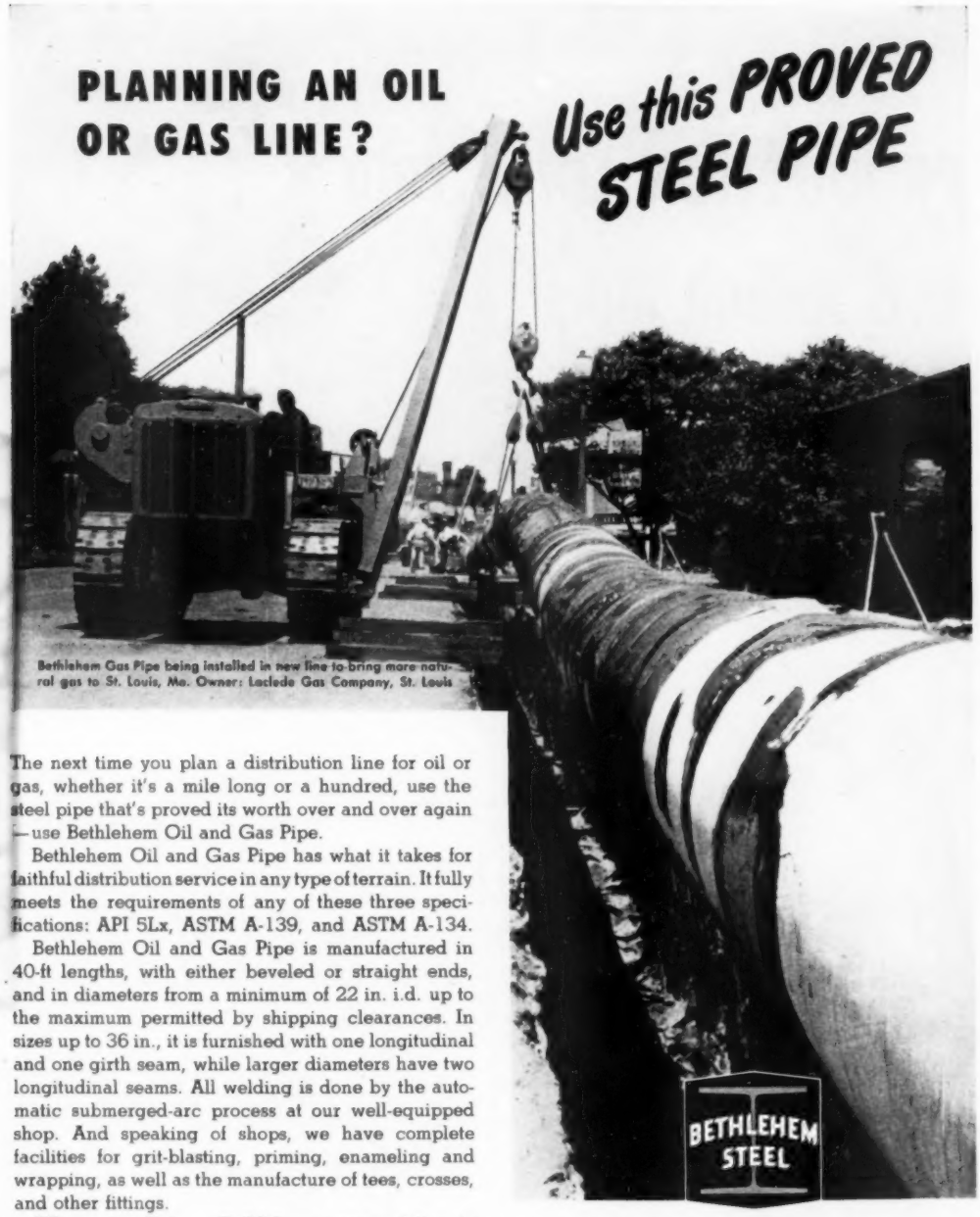
Mack TRUCKS

...outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

PLANNING AN OIL OR GAS LINE?

Use this PROVED STEEL PIPE



Bethlehem Gas Pipe being installed in new line to bring more natural gas to St. Louis, Mo. Owner: Laclede Gas Company, St. Louis

The next time you plan a distribution line for oil or gas, whether it's a mile long or a hundred, use the steel pipe that's proved its worth over and over again —use Bethlehem Oil and Gas Pipe.

Bethlehem Oil and Gas Pipe has what it takes for faithful distribution service in any type of terrain. It fully meets the requirements of any of these three specifications: API 5Lx, ASTM A-139, and ASTM A-134.

Bethlehem Oil and Gas Pipe is manufactured in 40-ft lengths, with either beveled or straight ends, and in diameters from a minimum of 22 in. i.d. up to the maximum permitted by shipping clearances. In sizes up to 36 in., it is furnished with one longitudinal and one girth seam, while larger diameters have two longitudinal seams. All welding is done by the automatic submerged-arc process at our well-equipped shop. And speaking of shops, we have complete facilities for grit-blasting, priming, enameling and wrapping, as well as the manufacture of tees, crosses, and other fittings.

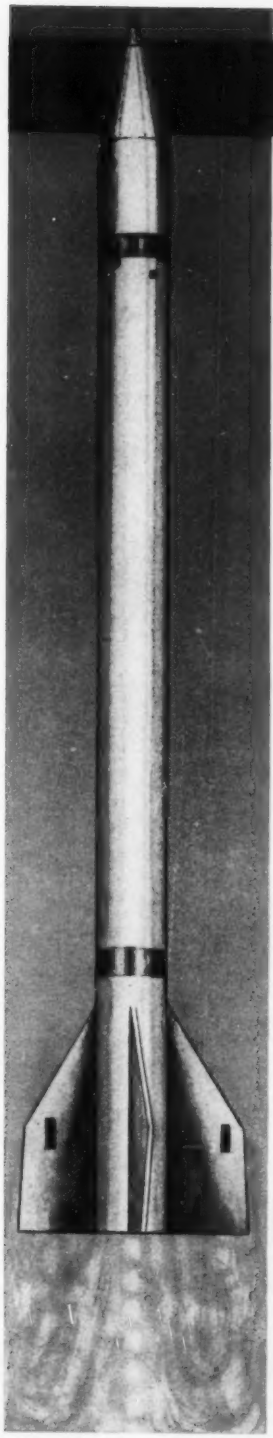
Why not call in a Bethlehem representative to discuss Bethlehem Oil and Gas Pipe in greater detail? His advice may save you a lot. Address your inquiry to the nearest Bethlehem sales office, or get in touch with us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

FABRICATED STEEL CONSTRUCTION

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM OIL AND GAS PIPE



MODERN FISHER® Improved LEVEL-TROL®

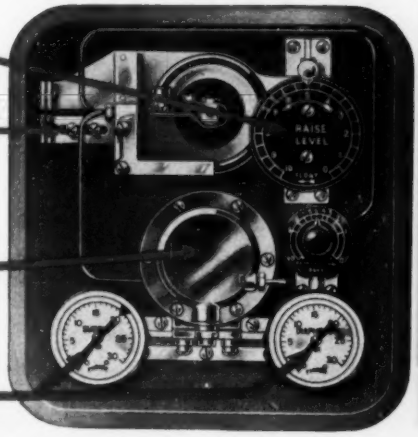
FOR LIQUID LEVEL CONTROL TRANSMISSION and INDICATION

Improved Feature
New level set adjustment. More highly visible.

Improved Feature
New factory calibrating adjustment makes possible accurate setting of proportional range over full float length.

Improved Feature
New relay—more compact—easily removed—easily assembled.

Improved Feature
Operating medium and diaphragm pressure gauges are glass-enclosed.



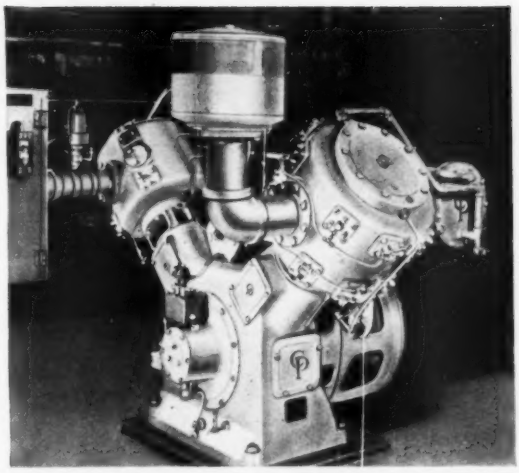
Type 2500-249
Level-Trol

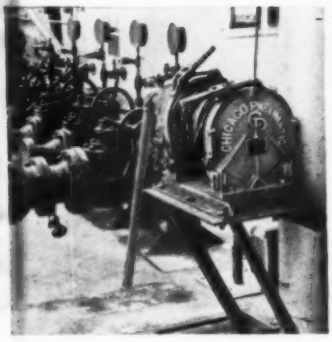
• This improved Fisher Series 2500 Level-Trol is designed to better meet the requirements of field service—to give longer life—ease of maintenance. It still combines proportional range and specific gravity setting in one simple adjustment. Die cast weather—proof pilot case with black enamel finish, and improved lock hasp. Series 2500 Pilot Assembly is interchangeable with Fisher Series 2405 Pilot Assemblies now in service.

FISHER GOVERNOR CO.

MARSHALLTOWN, IOWA

3 AIDS TO efficient REFINERY OPERATION





Chicago Pneumatic's space-thrifty TYPE Y COMPRESSOR, designed for close quarter installation, is shipped intact as a "package unit" ready for external connections. Sizes 75 to 250 h.p.

* * *

In dismantling and assembling pressure vessels, heat exchangers, and other bolted equipment, hours of heavy labor can be saved by using CP REVERSIBLE AIR IMPACT WRENCHES. Capacities to 1¾" bolt size.

* * *

Control of all raising, lowering, holding and "teasing" operations is effected entirely by means of clutch and brake levers on the ruggedly built, air-driven CP UTILITY WINCH. Catheads, available for all models, increase versatility.

Write for detailed information

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
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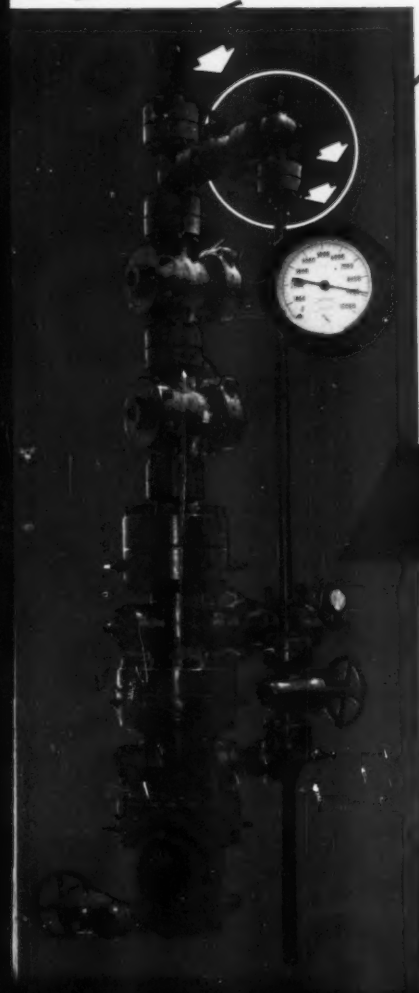
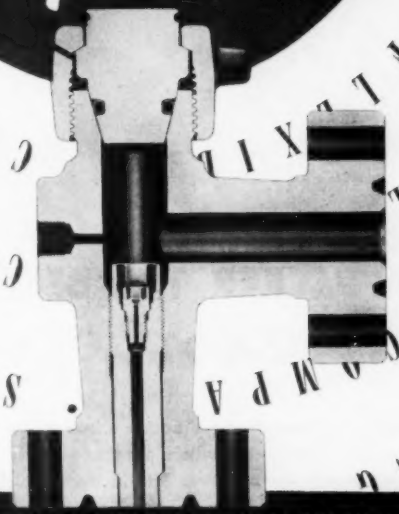
STRONG • FLEXIBLE • COMPACT • STRONG • FLEXIBLE • COMPACT • STRONG • FLEXIBLE • COMPACT • STRONG

WORKING PRESSURE TO 20,000 LBS.

is no problem





O-C-T "PC" CHOKES WERE DESIGNED SPECIFICALLY TO GET THE JOB DONE AT EXTREME PRESSURES

On Continental Oil Company's Estes No. 1, the "PC" Choke was a vital part of the "all O-C-T team" of dependable products on this world's highest pressure well. This O-C-T Choke was actually designed for trouble-free, long-life 15,000 and 20,000 lbs. service. It provides speed because bean replacement is accomplished simply by removing a hand tight cap. Besides, it provides flexibility and interchangeability of insert bean, regular bean or adjustable choke assembly. On your next well . . . on wells of any depth or pressure . . . take advantage of the added strength, safety, convenience and flexibility provided by dependable Oil Center Tool Company equipment. Ask your O-C-T Representative or write for details. All O-C-T equipment is available through your supply store.

Oil Center Tool Co.

P. O. BOX 3091 • HOUSTON, TEXAS

Canada — Canadian-Vickers, Montreal, Canada

Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Southall Middlesex, England. Address Export Inquiries for **All Other Countries** to P. O. Box 3091, Houston 1, Texas.

IS A PACKER THE BEST ANSWER ON THIS JOB?

ASK YOUR LANE-WELLS MAN!

It sometimes happens that a situation arises which a packer can handle — but where another piece of equipment would serve better. And in these situations you can depend on your Lane-Wells man to give you an honest answer. It's the first step in Lane-Wells Engineered Packer Service to tell you just what equipment will best serve the needs of your individual job.

Lane-Wells men are trained in all the latest techniques in field-proven uses and applications of packers. They can help you plan production and testing set ups; help lay out packer setting and packer pulling programs; advise on selection of packers and efficiency of packer set ups; and can give valuable tips on packer maintenance and repair.

And it's all for free, as you probably know. Engineered Packer Service by Lane-Wells is available to any operator, on request, regardless of the equipment he uses. It can be a big help, as many operators testify, and you're obligated for nothing—so why not

Ask your Lane-Wells Man — Today — about

AP-403

...by...

LANE WELLS

PRECISION PUMPING

with IDEAL Plunger lift

Synchronized timing of the plunger travel assures you maximum efficiency with the "Ideal" Type E Plunger Lift regulated by the improved "Ideal-Taylor" Type C Cycle Controller. Gas for pumping is used economically and with minimum draw-down of pressures . . . pumping efficiency is kept high.

Other money-saving features of an "Ideal" Plunger Lift installation include:

Economical installation . . . operates in standard API tubing . . . can generally be installed without pulling the present tubing.

Operation is controlled precisely with simple controls at the wellhead.

Economical on the gas supply . . . the flow line is fully closed at the right instant after each plunger stroke by a cam-operated pilot valve on the stack nipple.

Write for bulletins describing the various models of "Ideal" Plunger Lifts . . . then let our well engineers help you fit this low-cost, trouble-free system to suitable wells.

THE NATIONAL SUPPLY COMPANY

NATIONAL BLUE PRODUCTS

GENERAL SALES OFFICES: TOLEDO, OHIO

DIVISION OFFICES: CASPER; FT. WORTH; PITTSBURGH; TULSA; TORRANCE.

CANADA: THE NATIONAL SUPPLY COMPANY, LIMITED, ROOM 202, ALBERTA BLOCK, CALGARY, ALBERTA.

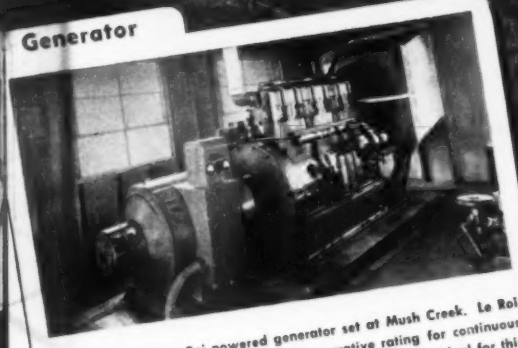
EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 30 ROCKEFELLER PLAZA, NEW YORK, N. Y., U. S. A. RIVER PLATE HOUSE, 12 SOUTH PLACE, LONDON E. C. 2.

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT . . . SPANG PIPE . . . SUPERIOR & ATLAS ENGINES

At Mush-Creek

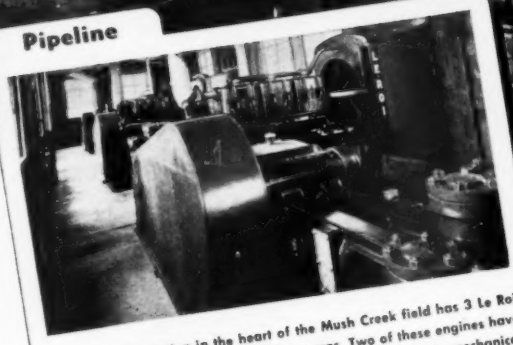
Drilling — two Le Roi H-2000 engines on a Wilson Giant Rig at Mush Creek. V-design is a characteristic of all Le Roi drilling engines 2000 cu. in. and larger. Advantages — lugging power and rapid acceleration through use of low-inertia rotating parts and single carburetion.

Generator



Here's a 75-KW Le Roi-powered generator set at Mush Creek. Le Roi engines (with their reserve power, conservative rating for continuous duty, good speed regulation, and low operating cost) are ideal for this type of service.

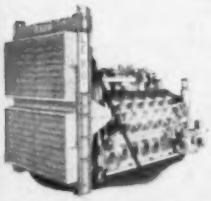
Pipeline



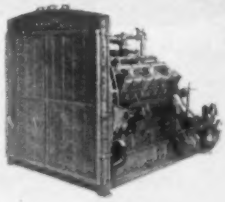
This pumping station in the heart of the Mush Creek field has 3 Le Roi F-1500 engines driving reciprocating pumps. Two of these engines have operated continuously for 27 months with no downtime for mechanical failure or even valve grinding. This is real proof of Le Roi dependability.

P-109

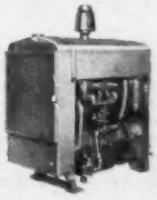
There's a Le Roi Engine for Every Oil Field Need



L-3460
HP range 280-600



RX Series
HP range 79-410

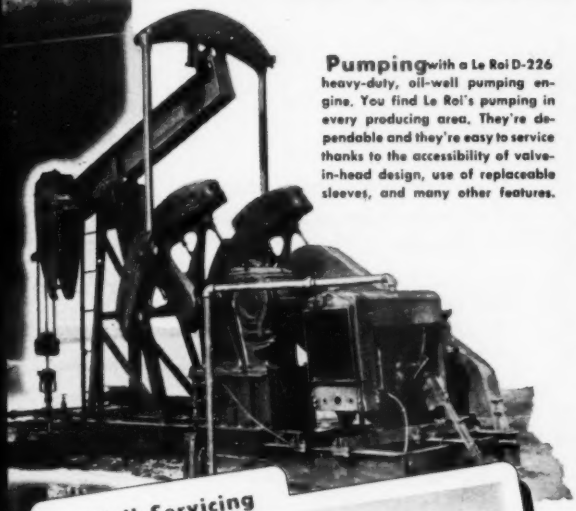


D Series and H-540
HP range 6-155

A Typical Le Roi Service Facility

This service shop, equipped with the finest tools available for engine overhaul, belongs to the Gehring Equipment Co., Casper, Wyoming. Gehring provides prompt service to an area stretching from the southern boundary of Colorado to the Canadian border. They maintain the only complete engine parts stock in the Rocky Mountain area. Emergency cases are handled by plane. It is because of service like this that you can always depend on Le Roi.

Fiddler–250 Le Roi Engines



Pumping with a Le Roi D-226 heavy-duty, oil-well pumping engine. You find Le Roi's pumping in every producing area. They're dependable and they're easy to service thanks to the accessibility of valve-in-head design, use of replaceable sleeves, and many other features.

...dependable, low-cost power for every application

These pictures, taken in the Mush-Creek Fiddler area, show the versatility of Le Roi power for oil-field service — drilling, workover, pumping, gathering, pipeline pumping, power generation — everything.

But, this is only part of the story. There are more than 250 Le Roi engines in this field. In fact, 80% of the engine requirements are powered by Le Roi.

This popularity is a fitting testimonial to the economy and dependability of Le Roi power. It is proof that you can enjoy the same advantages — no matter what your engine requirements may be. Call your Le Roi distributor — he can show you why Le Roi *leads the field in the field.*

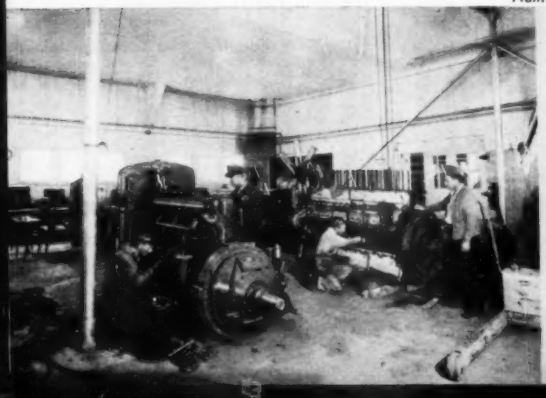
Well Servicing

A Le Roi V-8 H-540 powers this unit. It gives you a lot of power (155 hp), exceptional acceleration, and a wide speed range in a compact package. Like all Le Roi engines it has replaceable sleeves and valve-in-head design. Servicing is quick and easy.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio *Oilfield Headquarters:* Tulsa, Oklahoma



LEADS THE FIELD

Le Roi Oilfield Sales-

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.— Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company— Centralia, Illinois and St. Louis, Missouri.

IN THE FIELD...

Service Network

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

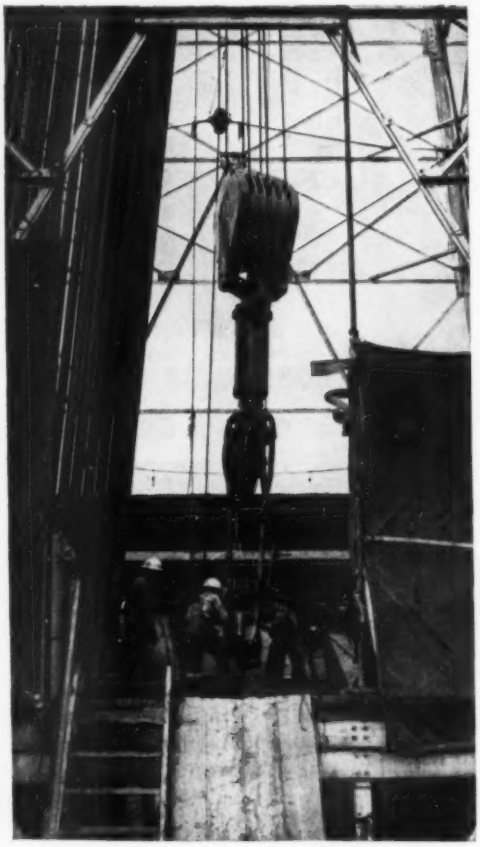
Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

WIRE ROPE



You get extras in Roebling Preformed Rope . . . extra toughness . . . extra life

YOU PAY FOR THE BEST when you buy wire rope. And you *get the best* when you buy Roebling Preformed "Blue Center" Steel Wire Rope. "Blue Center" steel is an exclusive Roebling product . . . gives rope the extra toughness that spells long life . . . service economy that really counts. Besides that, Roebling Preformed always spools better . . . reduces vibration and whipping . . . doesn't tend to set or kink.

Roebling makes a wide range of wire rope . . . brings you the right construction, grade and size for top performance and economy on each installation. Have your Roebling Field Man help select the *best* rope for your particular requirements. And for maximum savings, get his suggestions on the proper use and maintenance of wire rope. He knows the case histories of thousands of installations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

DISTRIBUTED BY THE NATIONAL SUPPLY COMPANY
REPUBLIC SUPPLY COMPANY

WHATEVER THE JOB...

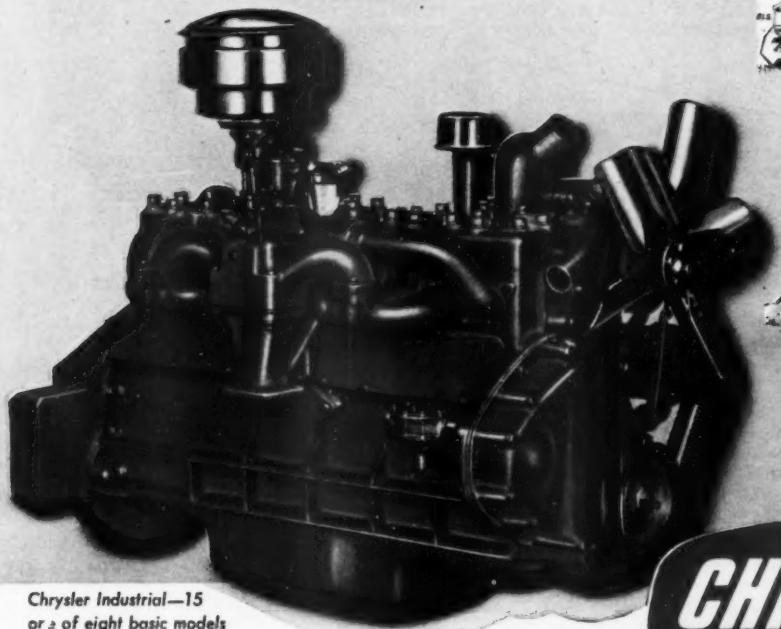
Chrysler Industrial Engines give Better Performance at Lower Cost!

In Construction, Chrysler Powers
Ditching Machines • Cranes • Truck Mixers • Shovels • Loaders • Yarders Concrete Mixers • Road Pavers Crane Carriers • Scoop Tractors

In Industry, Chrysler Powers
Air Compressors • Hoists • Derricks Pumps • Generators • Tractors • Arc Welders • Baling Machines • Conveyors • Tackle Blocks • Winches

In Farming, Chrysler Powers
Tractors • Combines • Gang Mowers Spreaders • Irrigation Equipment Orchard Sprayers • Hay Choppers Pumps • Feed Mills • Sprinklers

In Other Fields, Chrysler Powers
Locomotives • Motor Coaches • Drilling Equipment • Air Conditioning Equipment • Pulp Machines • Fire Pumps • Street Flushers • Snow Plows • Oil Well Pumps and Drillers



Chrysler Industrial—15 or 2 of eight basic models

Leading manufacturers and operators of industrial equipment are unanimous in their praise of Chrysler Industrial Engines.

For Chrysler Industrial Engines are designed and built specifically for rugged work. They are engineered to develop maximum power day-in, day-out with a minimum of down time and at a minimum operating cost. They are not only capable of wide application but they can also be adapted to specific regional operating conditions.

Chrysler Industrial Engines are backed by service everywhere.

A letter of inquiry will bring an engineer well qualified to discuss your application. Address: **Industrial Engine Division, The Chrysler Corporation, Detroit 31, Michigan.**

Up to 22 times

more operations without re-lubricating

HOMESTEAD-REISER

Self-Sealed

LUBRICATED PLUG

VALVES

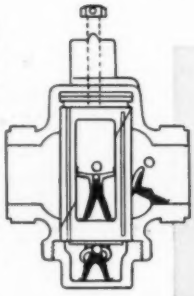
TEST RECORD VALVE	NO. OF OPERATIONS Without RE-LUBRICATING
VALVE "A"	5
VALVE "B"	33
HOMESTEAD-REISER VALVE	110

Each valve assembled with the manufacturer's recommended lubricant. Test made on 75 lb. air pressure.

This comparative test of a Homestead-Reiser Valve and two other well-known lubricated plug valves showed that the Homestead-Reiser Valve remained drop-tight through twenty-two times more operations than Valve "A" without re-lubricating, and through three times as many operations as Valve "B". That means that Homestead-Reisers require less attention, and give greater economy of lubricant.

Prove the superiority of Homestead-Reiser Valves to your own satisfaction, by installing a few in your plant, side by side with any other lubricated plug valve. They may be had in both semi-steel and cast-steel, sizes ½" to 12" for steam working pressures to 150 pounds, or oil-water-gas to 200 pounds.

Write for new catalog 39-5, and for prices on your requirements.



"Self-Sealed" MEANS

. . . that in addition to a full-port lubricant seal, the wedge-action of the plug under line pressure forces the finished surfaces of the plug outward, and constantly presses them against the seating surfaces of the body, thus keeping them always in intimate contact. The plug automatically adjusts itself for wear, assuring extra long life, maximum leakless service, and lubricant economy.

HOMESTEAD VALVE MANUFACTURING CO.

"Serving Since 1892"

P. O. Box 403 Coraopolis, Pa.

BLACK MAGIC *not only gives you greater production–but it has...*

drilled wells deeper

In a famous Gulf Coast wildcat, already the deepest ever drilled in this area and on its way to a new world's record, Black Magic has been used continuously for 16 months. Total cost of maintaining the oil base mud averages less than $25 a day, including all transportation charges from the Pre-mix Plant in Houston. The mud used previously required 12 to 16 hours to recondition after each round trip before it was in shape to resume drilling. Black Magic saved thousands of hours and dollars on this job, and made possible the record for depth, now below 20,000 feet.

drilled hotter wells

The stability of Black Magic under high temperatures is unequalled. Black Magic has not broken down when used in wells with bottom hole temperatures as high as 387°F. In simple laboratory tests, all other commercial drilling fluids (oil base and water-base alike) showed a definite deterioration at 250°F. Under actual high-temperature drilling conditions it would be costly to depend upon any other mud than Black Magic.

drilled thru more heaving shale

The recent use of Black Magic in a deep Gulf Coast well to combat a serious heaving shale condition was highly successful. Other jobs in similar areas have been equally startling. Black Magic's zero filtrate loss enables drilling through hydrous disintegrating shale where other methods have failed. The excellent plastering properties permits a "to gauge" hole, reduces drilling hazards and on many occasions has actually loosened stuck drill pipe. Salt, anhydrite, cement, etc. have no effect on Black Magic.

diamond-cored more footage

Because of the reduced circulating rates when coring with diamonds, Black Magic is the ideal drilling fluid for this type of work. For example, in a deep Oklahoma field where extensive diamond coring was used, not one single hour of mud conditioning time was shown on any well using Black Magic, whereas water base muds required constant care and maintenance costs were prohibitive. Black Magic does not flush or alter connate water in the core and recovery of 100% can be expected.

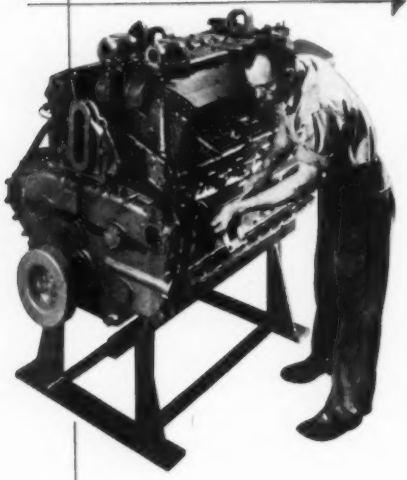
than any other oil base drilling fluid

For detailed information on any of the above cases, see your nearest Oil Base, Inc. representative. Send for a copy of "Oil Base Drilling Fluids," a paper presented at the Third World Petroleum Congress, held at The Hague, June 1951. This paper describes in detail all phases of the subject and exhibits proof you can't afford to overlook. Ask for Bulletin 102.

OIL BASE, INC. MAIN OFFICE and PLANT: 130 ORIS ST., COMPTON, CALIF.

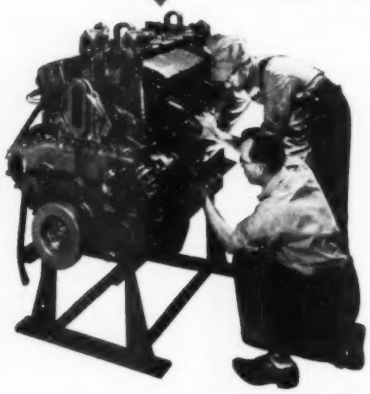
BLACK MAGIC • WHITE MAGIC • OB GEN • OB GEL • CHEMICAL "V" • CHEMICAL "X" • OB ZERO • OB MIX FIX • OB WATE • OB HEVYWATE • OB MUD GUNS • OIL BASE HAND CLEANER

BUILT NOT ONCE BUT TWICE!



Cummins is the custom-builder of the Diesel industry. Each engine is built to *fit the job*—and the individual piece of equipment in which it is to be installed. And *every* Cummins engine is built *twice*. First, each engine is assembled, run-in tested. Then it is disassembled completely, and inspected. Finally it is reassembled and tested *again*. This extra care in precision building, Cummins exclusive fuel system, efficient parts and service organization . . . mean *less* "down-time" and *more* power and profits for Cummins users. *See your Cummins dealer.*

Cummins®
CUSTOM BUILT Diesels



Lightweight High-speed Diesel Engines (50-550 hp) for: on-highway trucks • off-highway trucks • buses • tractors • earthmovers • shovels • cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: CUMMINS DIESEL EXPORT CORPORATION • Columbus, Indiana, U. S. A. • Cable: CUMDIEX

Diesel power by CUMMINS

CUMMINS Dependable DIESEL

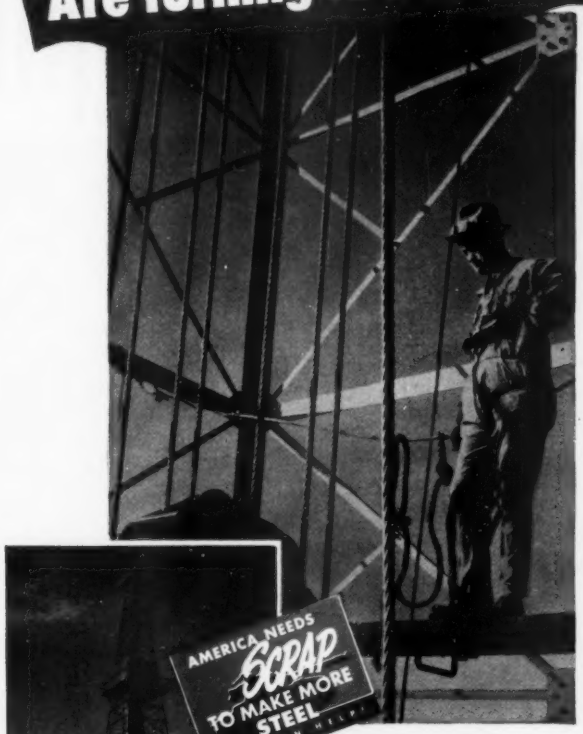
TRADEMARK REG. U. S. PAT. OFF.

Drillers Who Know Their 3 C's

- COST of Replacement
- COST of Downtime
- COST of Operating

J&L STEEL

Are turning to J&L Wire Rope



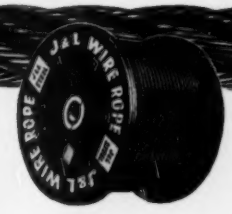
It doesn't take a wizard at mathematics to figure out that low operating costs mean economical operation and higher profits. That's why more and more smart drillers throughout the oil country are ordering J&L drilling lines for their rotary or cable tool rigs. Experience has proved that they'll get maximum service life—maximum hole per wire rope dollar with J&L.

The long service life of J&L Wire Rope is due to J&L's "quality controlled" method of manufacture. "Quality control" ensures the finest finished product by controlling every step in the manufacture of the wire rope from the mining of the ore to the final stranding and closing operations.

The result—long service life on the job, that's reflected on the balance sheet in low cost for wire rope, minimum downtime for rerigging and less man-hours spent installing new lines—in short, lower operating costs.

In addition, the popularity of J&L Wire Rope in the oil country is built on more than long service life. The men on the rigs like it too because it's easy to handle, spools smoothly, and is lubricated with J&L's exclusive Bronze-lube—the lubricant that's clean to handle, doesn't run out when the line gets warm.

If you're not already using J&L drilling lines, it will pay you to find out more about J&L quality controlled Wire Ropes. Why not contact your nearest J&L Wire Rope representative today?



JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Now—more than ever

M=PT

Morse means Power Transmission

Sensational, new does the oil field job

Close-up of the Morse HY-VO Drives used for transmitting power for the 1500-H.P., 600-R.P.M. Diesel-electric drawworks. Drives are 2" pitch, 12" wide.

Morse HY-VO (TRADE — MARK) Drive

that "couldn't be done"!

PROVIDES MEANS FOR TRANSMITTING POWER TO DRILL 20,000-FOOT HOLES . . . MAKING POSSIBLE 1500-H. P., 600-R. P. M. PORTABLE DIESEL-ELECTRIC DRAWWORKS

Experienced engineers said it "couldn't be done" with conventional chain drives.

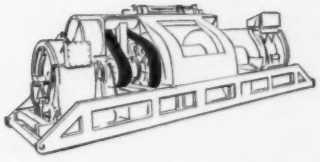
It couldn't be done, but the sensational, new Morse HY-VO Drives took the job in stride . . . an assignment requiring drives which would operate *twice as fast* with *three times the load* considered practical by manufacturers for conventional chain drives. And, the job was done with 2″-pitch, 12″-wide HY-VO Drives, allowing the unit to be *portable!*

Revolutionizes power transmission

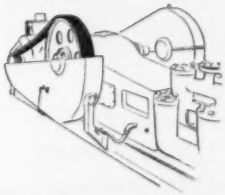
Entirely new design principles are used in the HY-VO Drive. Vibration and destructive linear pulsations are virtually eliminated, allowing the HY-VO Drive to operate at tremendously increased rotative speeds, using drives of much narrower widths. Cost-per-hour can be cut by as much as 50 per cent; service life is much longer.

Due to the shortage of materials and production facilities, orders for HY-VO Drives must carry a priority rating at the present time.

MORSE CHAIN COMPANY
7601 Central Avenue, Dept. 167 • Detroit 8, Michigan

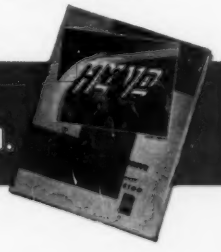


The drawworks, designed and built by EMSCO for Standard Oil Company of California. The rig is the first *portable* unit of its size and power.



The huge mud pumps used in connection with the drawworks are equipped with 1½″-pitch, 8″-wide Morse HY-VO Drives for transmitting 765 H.P. at 1120 R.P.M.

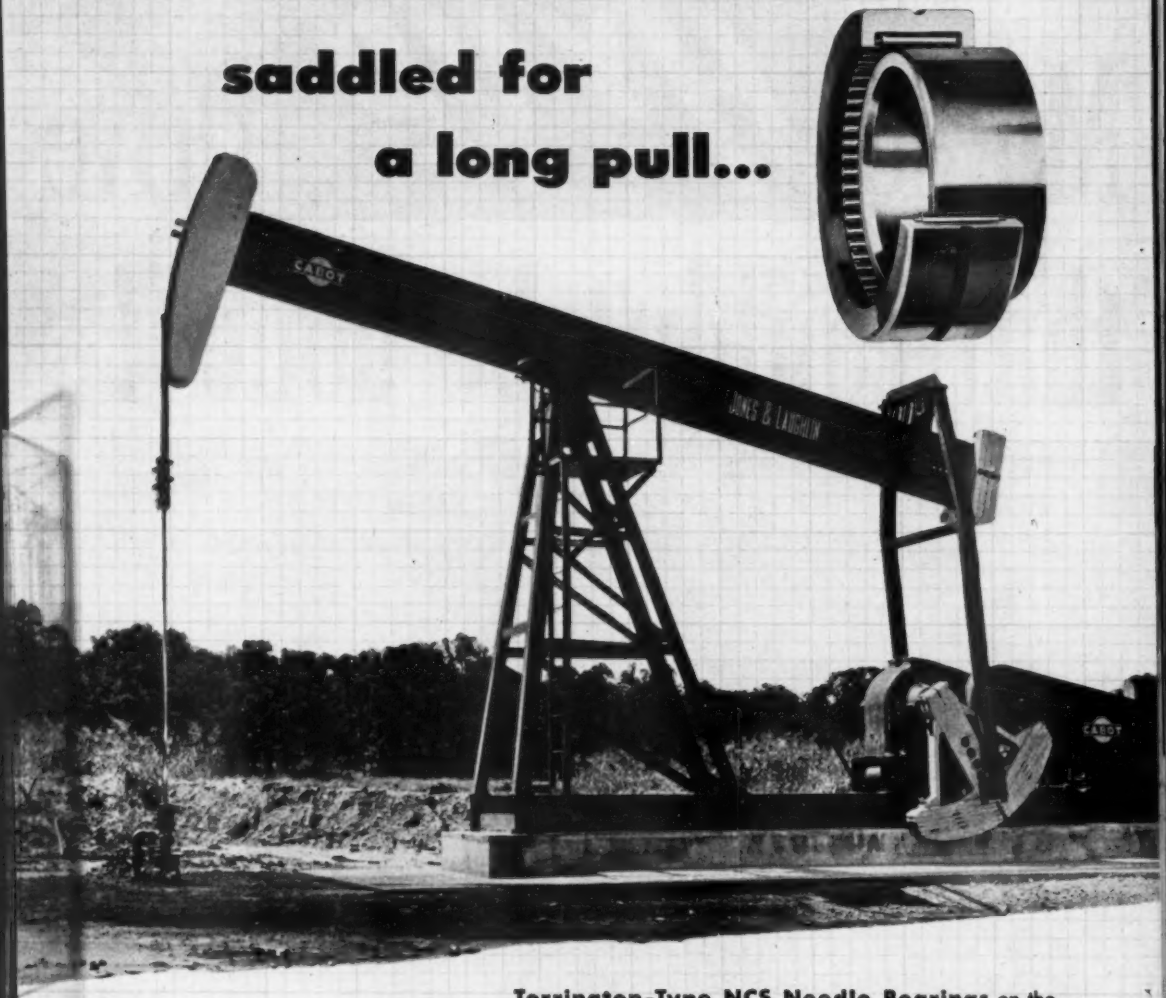
Write today for Catalog No. C-72-51.



MORSE
MECHANICAL
POWER TRANSMISSION
PRODUCTS

PRODUCTS OF BW BORG-WARNER

saddled for a long pull...



SPHERICAL ROLLER
TAPERED ROLLER
STRAIGHT ROLLER
NEEDLE
BALL
NEEDLE ROLLERS

TORRINGTON BEARINGS

Torrington-Type NCS Needle Bearings on the saddle assembly of Cabot Shops, Inc. pumping units help deliver the smooth, rugged power needed on wells 7000 feet and deeper—a really long pull.

The compact design of these heavy duty bearings provides high capacity in minimum space . . . simplifies assembly and maintenance. The full complement of rollers presents large load-carrying area, and spreads lubricant evenly over all bearing contact surfaces.

With years of experience in designing and building all major types of anti-friction bearings, Torrington engineers will welcome the opportunity to help solve your bearing problems

THE TORRINGTON COMPANY

South Bend 21, Ind. • Torrington, Conn.

District Offices and Distributors in Principal Cities of United States and Canada

R·P&C VALVES

NO. **1050**
Stainless
Steel
Bar Stock
Valve

R-P&C Bar Stock Valves are an achievement of the valve makers' craft. They are precision turned . . . from carefully tested metals . . . and suitable for a wide range of pressures and temperatures . . . for meter, gauge, test, and general purposes.

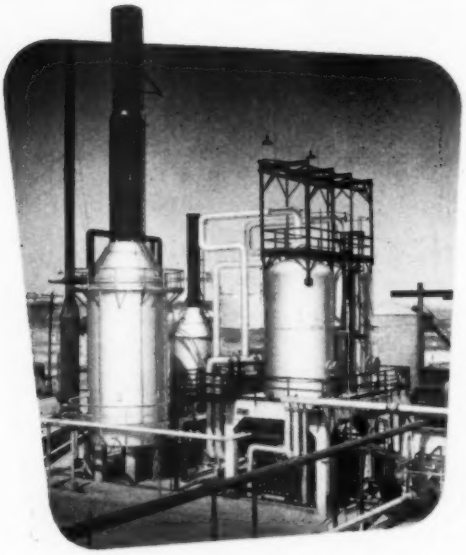
Rugged construction of R-P&C Bar Stock Valves means long, low-cost, trouble-free service. No better bar stock valves are made. See your R-P&C distributor today or write the nearest R-P&C district office for information.

ACCO

R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

"Intentionally Better"
READING-PRATT & CADY VALVES

ENGINEERS TO THE REFINING INDUSTRY



FOR a complete new refinery, or a simple job of modernization, you'll find Koch's 26 years of experience invaluable. This experience is a "plus" that costs you nothing extra. We invite you to "Call on Koch" to discuss your next project.

THE KOCH ENGINEERING COMPANY, INC.

DESIGNERS • MANUFACTURERS • BUILDERS ★ 335 WEST LEWIS STREET • WICHITA, KANSAS

British Associates: Messrs. A. F. Craig & Co., Ltd., Paisley, Scotland

They Say—

Not Enough in Texas?

"The silence surrounding the plans . . . to pipe Texas gas to the Pacific Northwest, has been overwhelming in recent months. The silence first became noticeable last December when the Interstate Oil Compact Commission met in Houston and bluntly told the Texans they were exporting more gas than was justified by their proven reserves.

"Possibility that anything could be in short supply in Texas apparently was something the Lone Star boys had never considered. When the Alberta petroleum and natural gas conservation board made its report, calling for a sensible long-range approach to the Alberta natural-gas picture, the Texans did some thinking.

"Result was the Texas resolution, recently passed in the Texas Legislature upon the instigation of Rep. R. E. Blount, Big Spring oil man. The resolution acknowledges that Texas gas will be exhausted in 15 years at present rates, and the biggest state in the Union—with no water power and little coal—may be facing a serious fuel shortage thereafter.

"Furthermore, Texas gas prices have rapidly increased in recent months, as exports have tripled in the last 4 years. Crux of the resolution was the demand that the Texas commission governing pipe-line franchises hereafter 'oppose the granting of additional certificates to the promoters of interstate pipe lines.'"

Rhea Felknor's column in the Spokane, Wash., Spokesman-Review.

Keep the Gas at Home!

"Kansas is a part-landlord for the biggest supply of natural gas in the world—the Hugoton field. Gas is an exhaustible resource. As increasingly greater amounts are piped to eastern industrial centers, it becomes apparent that Kansas soon will be in the absurd position of building up eastern industries at the expense of its own people and own factories, in reality this entire area.

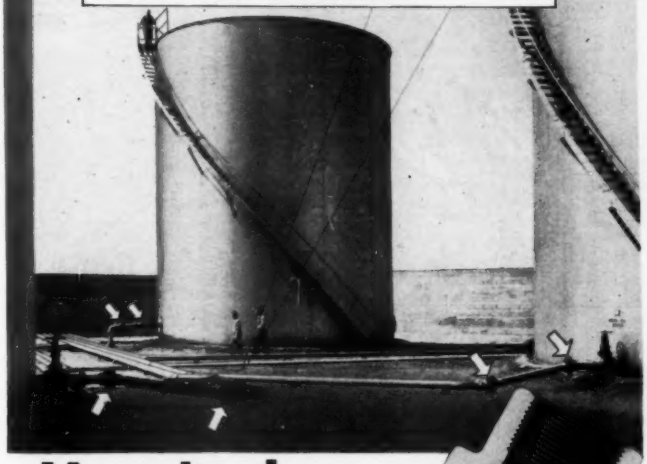
"Previous efforts to insure that Kansas homes, schools, public buildings and industries be guaranteed adequate supplies of gas before the surplus is sent outside the borders have been fruitless. Proposed legislation has got nowhere. That is easily understandable. The Kansas Legislature, in the past, has been subservient to the large oil and gas interests, which have been generous contributors to political campaigns.

"Sentiment is growing for better control of this disappearing fuel.

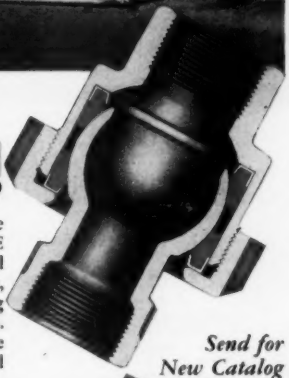
"The Magic Circle Industrial Coun-

How Would You Solve
THIS PIPING PROBLEM?

THIS PICTURE shows how a typical piping problem is solved easily and economically with BARCO FLEXIBLE BALL JOINTS. The tanks at this West Coast river terminal are irregularly spaced on rolling ground at various elevations. Connecting them with rigid piping would have required careful surveying, pipe cutting, and figuring of angles. With Barco Joints, careful measurement and alignment is unnecessary. These fireproof, flexible connections also provide valuable protection against tank settling and earth tremors or shocks.



Here's the
ANSWER!



THERE are many ways you can use Barco Ball Joints to save you TIME and MONEY on Tank Connections, Field Piping, Loading and Unloading Lines, Mud Pump Lines, and all kinds of piping for oil, steam, gas, water, or chemicals. *Barco gives you everything you want.* Side flexibility up to 40°, plus 360° swivel movement. 15 standard sizes, ¼" to 12". Angle or straight, male or female threaded connections—flanged connections—welding ends for welded connections. Built for wide range of pressures, temperatures, conditions. Fire-proof, pressure-safe! Gaskets renewable. Standard throughout the world—available through any supply company. BARCO MANUFACTURING CO., 1839F Winnemac Ave., Chicago 40, Ill. In Canada: The Holden Co., Ltd., Montreal.

Send for New Catalog No. 215.

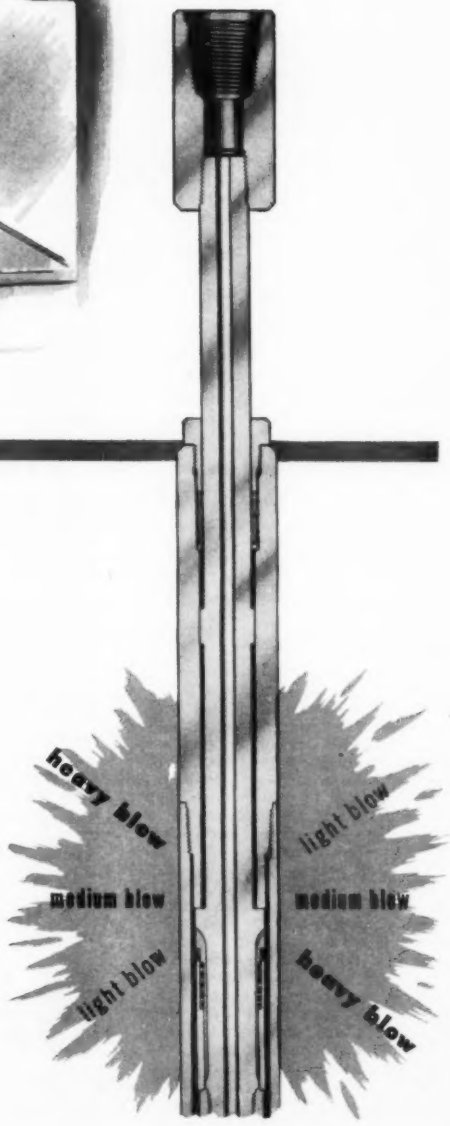
BARCO FLEXIBLE BALL JOINTS

The Only Truly Complete Line of Flexible, Swivel, Swing, and Revolving Joints

FREE ENTERPRISE — THE CORNERSTONE OF AMERICAN PROSPERITY

The right jar
for the job at hand

Jarring Jerry



THE JOHNSTON-SUTLIFF HYDRAULIC JAR

A Jar that hits any desired blow, at any time, to meet any condition—without pulling out of the hole.

Write For Descriptive Literature!

JOHNSTON

SHOOT • TEST

M. O. JOHNSTON OIL FIELD SERVICE CORPORATION
3035 Andrita Street — Los Angeles 65, California
"Servicing California & Rocky Mountains"

M. O. JOHNSTON OIL FIELD EXPORT CORPORATION
3035 Andrita Street — Los Angeles 65, California
"Exclusive Export Sales"

cil, representing Missouri, Arkansas, Iowa, Nebraska, Kansas and Oklahoma, is getting ready to make a fight for increased use of industrial gas in the Middle West, and curtailments of the eastern shipments. One proposal is for gas acreage dedicated for use in the area.

"The project merits public support." *Editorial in the Kansas City Times.*

Where Is the Steel Going?

"Businessmen . . . hear from many sources that the steel industry has been, and still is, expanding and that we are producing more steel now than ever before in our history. . . .

"It is only natural that we in the steel industry should be continually asked on all sides, 'where is all the steel going, and why is it, with more and more being produced, we find it so difficult to meet our share?'

"The real cause of our mutual discomfort appears to be that the people of this country want to eat their cake and have it too. . . .

"With simple faith that somehow tomorrow will solve tomorrow's problems, we go blithely forward, hoping that sheer volume alone may be expected to provide the solution to all our difficulties. We are turning out rifles and cannon and tanks and ammunition for the army as fast as we are currently able—and at the same time we have been pouring out huge quantities of automobiles and refrigerators and kitchen stoves and coffee percolators. We are building new military planes and guided missiles with unflagging energy—and at the same time we have been erecting new houses, new commercial and institutional buildings and building new arterial highways galore. We are making strenuous efforts to improve our logistics facilities primarily to make adequate transportation equipment available to the military if, when and as they should need it—and at the same time we have been expanding our output of electrical equipment, chemical process equipment, machine tools, materials handling equipment, television sets, and nylon stockings.

"I am not debating the propriety of these things. I am not arguing the whys and wherefores of guns versus butter, or of guns and butter. I am merely saying that this is what we have been doing up to now, and seemingly, this is what we would like to continue to do in the future."

Bennett S. Chapple, Jr., United States Steel Corp., addressing New York Railroad Club.

CALENDAR

May

Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, Division of

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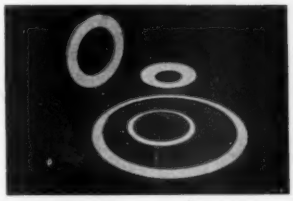

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Elongation @ 77 F	100 to 200%	Heat Distortion Temperature for 66 psi.	270 F
Flexural Strength @ 77 F	Did not break (D790-44T)	Surface Arc-Resistance	Does not track even after 1200 seconds of exposure ASTM D 495-42
Stiffness @ 77 F	60,000 psi.	Volume Resistivity	10^{18} ohm-cm.
Izod Impact Strength @ 70 F 77 F 170 F	2.0 ft.-lb./in. 4.0 ft.-lb./in. 6.0 ft.-lb./in.	Surface Resistivity @ 100% Rel. Hum.	3.6×10^{4} megohms
Durometer Hardness	55 to 70	Dielectric Constant, 60 to 10^{8} Cycles	2.0-2.05
Compressive Stress @ 0.1% Deformation	1700 psi.	Power Factor, 60 to 10^{8} Cycles	0.0003
Deformation under Load @ 122 F, 1200 psi., 85 hr.	4 to 8%	Water Absorption	0.0%
Coefficient of Linear Thermal Expansion from 77 to 140 F	5.5×10^{-5} per deg. F	Flammability	Nonflammable
Thermal Conductivity	1.7 Btu./hr./sq. ft./deg. F/in.	Resistance to Weathering	Excellent
		Specific Gravity	2.1 to 2.3

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Production, midyear meeting, Brown Palace Hotel, Denver, May 28-June 1.

Institution of Gas Engineers, London, England, May 29-June 1.

Sixth Annual Short Course in Gas Technology, sponsored by Southern Gas Association, Texas College of Arts and Industries, Kingsville, Tex., May 30-June 1.

Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont., May 31-June 1.

June

Society of Automotive Engineers, Inc., summer meeting, French Lick Springs Hotel, French Lick, Ind., June 3-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, June 4.

National Oil Scouts and Landmen's Association, annual convention, Hotel Beaumont, Beaumont, Tex., June 7-9.

Rocky Mountain Oil and Gas Association, midyear meeting, Henning Hotel, Casper, Wyo., June 8-9.

Liquefied Petroleum Gas Association, Inc., first annual Mountain States district convention and trade show, Troutdale-in-the-Pines, Evergreen, Colo., June 10-12.

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Pennsylvania Grade Crude Oil Association, 1951 annual meeting, Hotel William Penn, Pittsburgh, June 14-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

Petroleum Equipment Suppliers Association, annual meeting, Chateau Frontenac, Quebec, Canada, June 17-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

Kentucky Oil and Gas Association, annual meeting, Ventura and Henry Clay hotels, Ashland, Ky., June 21-22.

American Institute of Electrical Engineers, summer general meeting, Royal York Hotel, Toronto, June 25-29.

July

Wyoming Geological Association, sixth annual field conference, Rawlins, Wyo., July 31-August 3.

August

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

September

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 4-6.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 21-23.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engi-

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neers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

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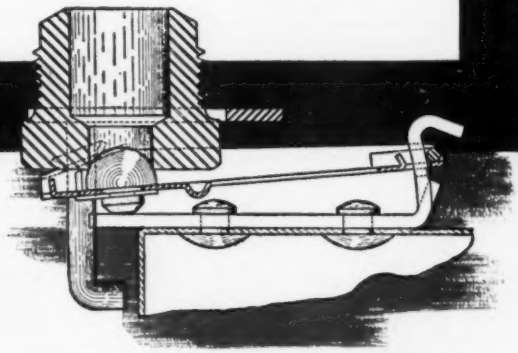

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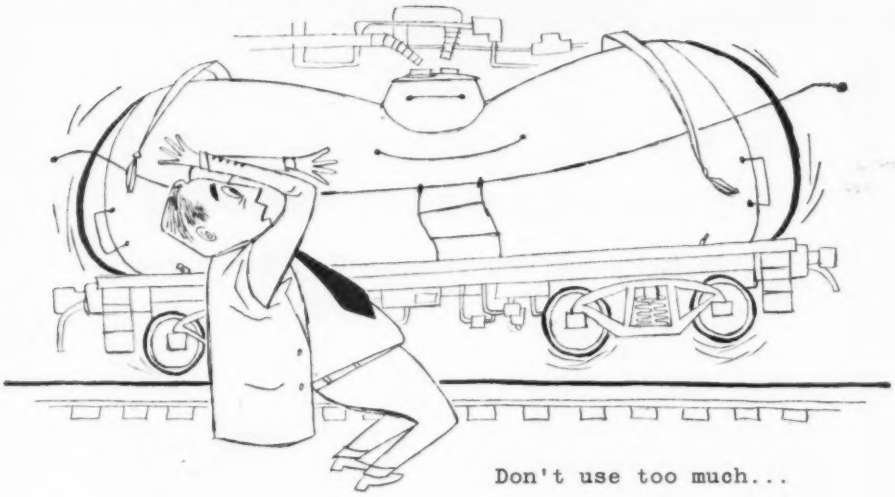

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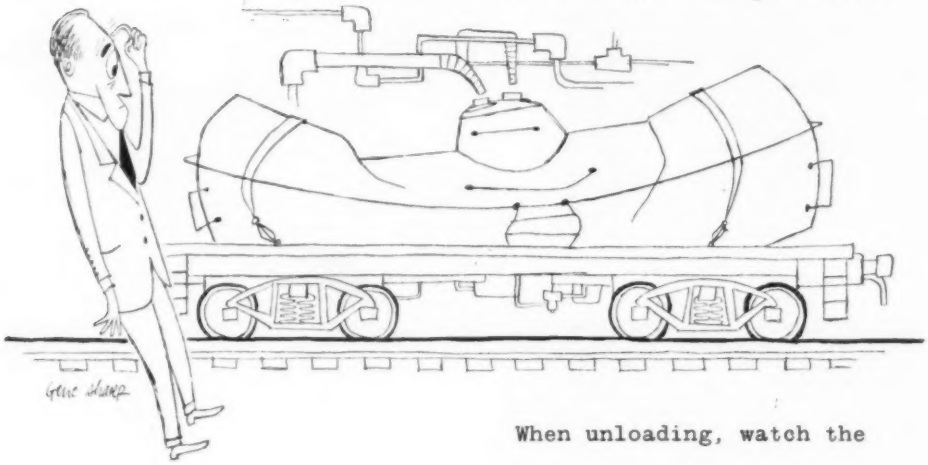
or too little air pressure..



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JOURNALLY Speaking

Meet Our Annie

FOR many weeks, like any expectant father, we've been priming you to get ready to meet our new baby, already nicknamed Annie. Annie's full name is Golden Anniversary Number, 50 Years of Oil in the Southwest.

Annie should have reached your desk as a supplement to this issue, and if she didn't you had better sic the FBI on whoever opened your mail. Annie has 484 pages and wears a chocolate-brown dress with a gold seal and lettering and a colored painting by our staff artist, Dud Johnston. We tell you this so you won't miss the copy to which you are entitled as a subscriber, because we're certain you'll want to keep it a long time.

Don't let the word "history" scare you off. History can be a pretty dull subject, but also it can be mighty interesting. We tried to make this history interesting by writing it from the viewpoint of an operating oil man instead of the viewpoint of a history professor. So don't expect to find just all the details about just everything. Our Annie is a book to read, not a catalog of names and dates.

Our objective was to give a running account of the highlights of history in oildom, not so much to rouse the nostalgia of the old timers as to show the youngsters of oil what their spiritual grandpappies went through. Our own theory about a history is that its value depends on the degree to which it helps a fellow lick the problems of today and tomorrow. So in selecting from the enormous mass of material we gathered in our months of research, we tried to put into Annie those things which point the way in which the industry has progressed.

Proud as we are of the editorial material we are calling your special attention to the advertisements. They tell some mighty interesting stories, too. No branch of the oil industry could have got very far without the contributions of the equipment manufacturers and the service companies, and a lot of these concerns have used the pages of our Annie to tell their own stories.

We'd be delighted to hear your own reactions after reading our Golden Annie, but our own impressions can be summed up about like this: Petroleum is one swell, big, fast-moving industry and the progress it has made in the past half-century is just a starter; you ain't seen nothin' yet.

Life Begins at 50

NOW that we've reached our fiftieth year — and by "we" we mean the Journal and not ourself personally—some folks might think that we ought to be showing signs of senility and decrepitude. But just the opposite is true. We feel a lot more youngish and peppy than we did even a few years ago.

A famous psychologist once wrote a best-selling book expounding the theory that life begins at 40. That's okay for people, but as for a publication, we think we're just getting our stride at 50, just beginning to really live. Got a lot more bounce to the ounce than at 40, or 30, or 20. Intend to keep right on kicking up our heels for at least another 50 years, too, by cracky.

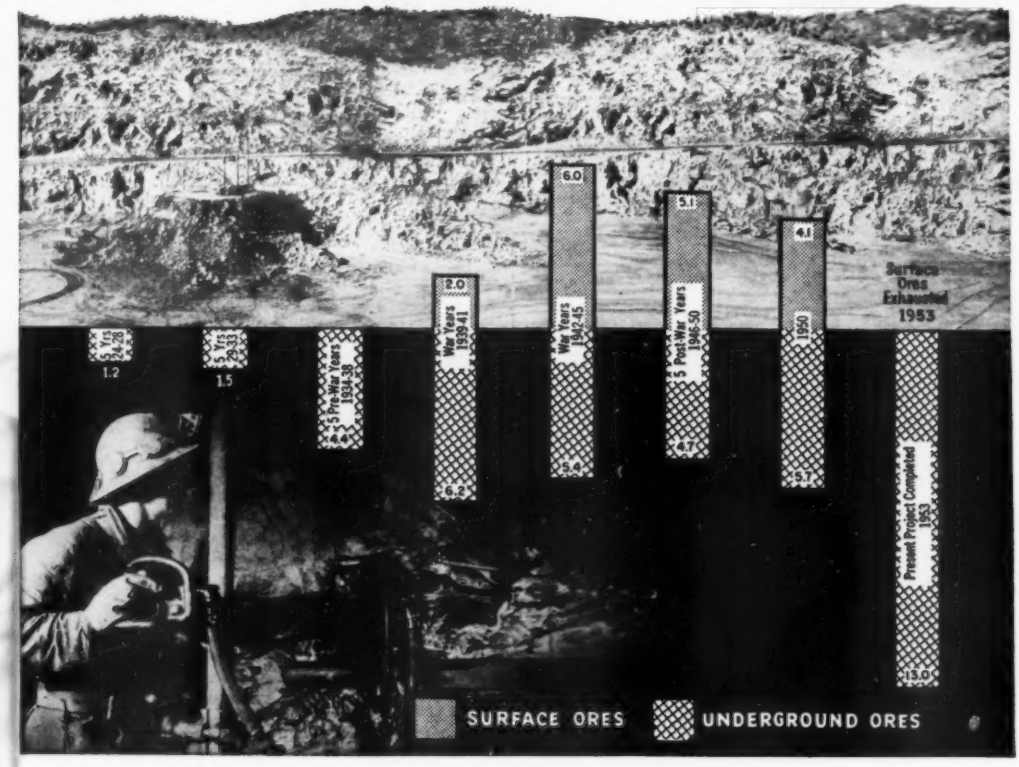
Not that the Big Yellow Book ever wore a gray beard or hobbled around on crutches. It always was right in the big middle of things, slugging away with a vigor and youthfulness which surprised even some of the present Journal family when we began reviewing our own history.

That history of ourselves appears in the big Golden Anniversary supplement to this issue. We ended up by giving it quite a bit of space because it is so intimately interwoven with the history of the oil industry as a whole. We couldn't tell the Journal Story without explaining the background and significance of contemporary events in the industry. And when we had done this we discovered that we had a pretty fair running history of petroleum during the first half of this Twentieth Century.

So when you read the Journal Story you'll see that the Big Yellow Book got where it is by promoting progress for petroleum all the way. And we intend to keep right on doing it. This backward look at our youth only inspires us to maintain our youthful attitude. Stick around another 50 years and watch us do it.

Henry D. Ralph.

Underground and surface ORE MINED (yearly average—millions of tons)



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This record, 22% greater than the 209,292,257 pounds delivered in 1949, was no accident ...

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Major expansion in output of nickel from underground operations is being driven to conclusion with utmost speed. There is still much construction to be done and a number of mining and metallurgical problems remain to be solved and tested in actual operation. Barring unforeseen interruptions, full conversion to underground mining should be completed in 1953.

When the present undertaking is completed, INCO will be able to hoist 13,000,000 tons annually, and the size of its underground mining operation will surpass that of any other nonferrous base metal mining operation in the world.

This underground expansion is being completed by INCO without interrupting current production of nickel, which is at maximum capacity.

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May 31, 1951

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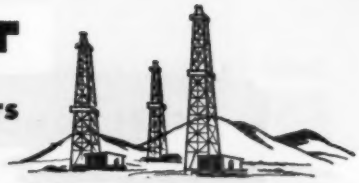
A RIG SIDE CHAT

about Baker Retainer Production Packers



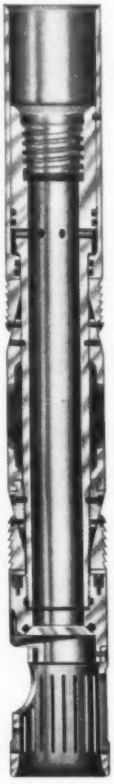
What we want to talk about today is how the Baker Production Packer is set securely in the casing, anchored against either upward or downward movement, with the tubing production string left free from the packer. The tubing is run through the body of the packer for production, and is free to be pulled at any time without disturbing the packer. In the typical application drawing (far right) the packer has been set and anchored to the casing by the two sets of opposing slips, with the Hycar packing unit sealed-off against the casing and retained in position by lead seals.

We want to produce from a zone below the packer so we make up the string with a Baker Perforated Production Tube on bottom (with operator's tubing to provide an additional stinger, if desired); above is a Baker Multi-V Tubing Seal Nipple; next a No Left Turn Latching Sub; and above that comes the tubing. Now we run-in the well until the Latching Sub engages in the top of the packer. The engaged Sub automatically positions the Multi-V Tubing Seal Nipple accurately in the smooth bore of the packer, and with 3 Hycar rings facing up and 5 more facing down, a perfect seal is obtained between the tubing string and the packer bore. Meanwhile, the Perforated Production Tube, as it was run through the bore of the packer, has unseated the Flapper Valve and now holds it in open position.

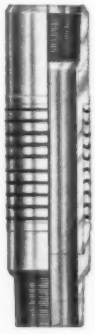
It's as simple as that, and we are ready to produce through the ⅜-inch holes in the Perforated Production Tube. These holes prevent junk, debris and large pieces of shale from entering and clogging the production string; and the total area of all holes is equal to or greater than the area of the tubing string.

When the tubing string is pulled at some future time, the Flapper Valve in the lower end of the packer body snaps back into the closed position and maintains a fluid-tight seal against upward pressure from below. The packer is not disturbed by pulling the tubing string, but remains packed-off against the casing ready for future operations.

This is only one of the many applications of the Baker Retainer Production Packer for single-zone or multiple-zone production; for selective testing and acidizing; for protection of casing from pressure or from destructive fluids, or gases; and other profitable uses.

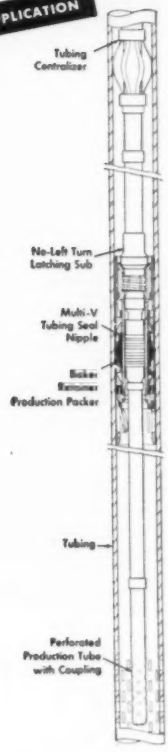


Baker Model "D" Retainer Production Packer Product No. 415-D



BAKER TUBING SEAL NIPPLE, MULTI-V TYPE, which effects a fluid-tight seal between the tubing string and the bore of the Packer.

TYPICAL APPLICATION



Single zone hook-up with production string anchored to packer, for: (a) keeping production string in tension to eliminate "tubing breathing" during the pumping cycle; (b) producing by flowing, without imposing excessive weight on packer to hold Tubing Seal Nipple positioned in packer bore; (c) making high pressure injection of gas or fluid for re-pressuring or secondary recovery.

Production string is run-in until No Left Turn Latching Sub rests on top of packer, indicated by drop in weight on strain gauge or weight indicator. The production string is then raised about 5 feet, and the zone washed and brought in, if it will flow.

If you would like to continue this rig-side chat at any well where you have a production packer problem, call the nearest Baker "Service Engineer." He will have helpful suggestions, and he is as near as your telephone . . .

Abilene 6820; Bakersfield 2-7487; Beaumont 4-5171; Brookhaven 1438; Casper 588-R; Coalinga 174; Corpus Christi 2-2251; Cut Bank 169; Dallas Riverside 4042; Duncan 3084; El Campo 118; Elk City 188; Falfurrias 197-W; Great Bend 5681; Harvey New Orleans Exchange, Uptown 3966; Hobbs 1040; Houma 8239; Houston Wayside 2107; Kilgore 3588; Lake Charles 6-5304; Laurel 4387; Levelland 313; Los Angeles JEfferson 8211; Magnolia 980; McAllen 2464; Natchez 181; New Orleans Magnolia 7724; Odessa 2185 or 4932; Oklahoma City 58-4445; Olney 482; Pampa 4755; Scott Lafayette 2219W; Seminole 584; Shreveport 4-1724; Snyder 637; Taft 5-2355; Tulsa 2-8083; Ventura Miller 3-3800; Victoria 314; West Branch 17; Wichita Falls 2-4776; Worland 514.

BAKER OIL TOOLS, INC. HOUSTON · LOS ANGELES · NEW YORK

BAKER

RETAINER PRODUCTION PACKER

PRODUCT NO. 415-D

No Gravy Train

A large group of refinery and other construction projects has been granted accelerated amortization as authorized by defense legislation. The same privilege has been given steel and many other industries, and the entire policy is under severe criticism in some quarters as a "bonanza" and a "shovel in the barrel."

Close examination should show that it is no such thing insofar as the program has been applied to petroleum projects. Amortization, as used here, means that every year a firm may recoup out of its profits, before paying federal income tax, a portion of its capital investment in new equipment. The tax authorities fix an assumed life for such facilities, say 15 or 20 years for a refinery. Projects with acceleration certificates may write off as much as 20 per cent a year, or the entire cost in 5 years.

If there are no profits there is no writeoff. And if profits continue after the investment has been recovered, whether in 5 years or 20, the full federal tax must be paid on all profits. There is no government loan or grant, and not necessarily any tax forgiveness.

Private industry is investing its own capital in a project which the Government wants built in a hurry for defense reasons. Most of these projects probably will have some civilian use after 5 years, but this is uncertain. So the Government helps resolve the uncertainty by postponing the full imposition of taxes. If the project has no further military or civilian use after 5 years, and if the firm has little or no profits on its entire operations, the Government may lose some of the taxes it might have collected had there been no accelerated amortization.

But if the reverse is true, the company may pay much higher taxes after 5 years. Many companies found this out after the war when they had taken full advantage of accelerated amortization and had nothing more to write off against high profits. The same may be true again, particularly as it appears that federal taxes will be higher 5 years from now. This may be especially true in the case of large oil companies with a wide profit base.

Accelerated amortization is no gravy train, no shovel in the barrel. It is quite possible that over a period of 20 years the Government will not lose a dollar of taxes. Whatever it may lose will be a lot less than if it built its own plants to make aviation gasoline and other munitions.

In the meantime this short-term tax inducement is resulting in the use of private funds to build up refining and petrochemical capacity to wartime needs at a rapid rate. If the owners get back only their capital costs—or less—the Government gets no tax but the plants are there for standby defense needs. If the owners get back their investment and make a profit to boot, the Government will tax 100 per cent of the profits at whatever the rate is 5 years from now.

THIS WEEK

INDUSTRY—C. C. Harmon and associates sell Oklahoma water-flood acreage to Sinclair for reported $4,000,000. . . . In second deal, Harmon sells other Oklahoma leases to Whitehill Oil Corp. for about $500,000. . . . ¶Coalinga Nose Unit purchases Binkley-Nidever lease in Coalinga Nose field. . . . Will pay Universal Consolidated, owner, 10,000,000 bbl. of oil over 10-year period and $528,000 for lease facilities and equipment. . . . ¶New method of recovering sulfur from refinery gas and sour field gas announced by Jefferson Lake Sulphur Co. . . .

INTERNATIONAL—New discovery indicates eighth producing area in Saudi Arabia. . . . Well flows 30.5°-gravity oil from 6,900 ft. . . . ¶Pemex buys Mexican holdings of three Gulf subsidiaries for $2,350,000. . . . Sale includes 1,000,000 bbl. of stored oil, concessions, 1,500 bbl. of daily production, pipe lines, terminals, storage facilities. . . . ¶Phillips building gas-repressuring plant and crude-stabilization plant adjacent to site of refinery now under construction in San Roque field of Venezuela. . . . ¶Crisis in Iranian situation expected by some observers to come this week. . . .

ACTIVITY—Crude production averaged 6,092,325 bbl. daily for week ended May 26, down 13,180 bbl. daily from previous week. . . . ¶Well completions totaled 824 for the week, compared with 794 for same week last year. . . . Wildcat completions decreased 41 wells from the all-time high of previous week to 201. . . . ¶Rotary rigs operating in United States on May 21 set another record with 2,491 rigs, compared with 2,103 for same date last year. . . .

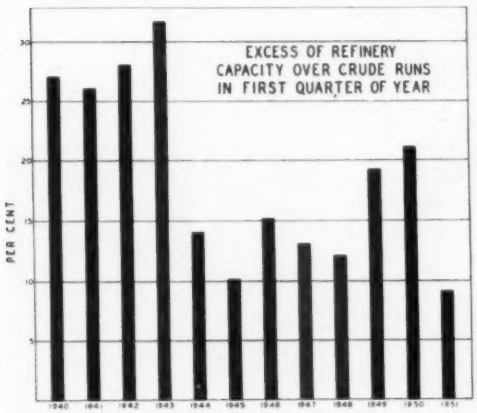
TRENDS—Rotary rigs operating in United States for 5 weeks ended May 21 averaged 2,417, an increase of 349 rigs over same period in 1950. . . . ¶Excluding cable tool areas in New York, Pennsylvania, Ohio, and West Virginia, total completions through May 26 were 480 wells more than last year with 96 wells of the increase in the last 3 weeks. . . .

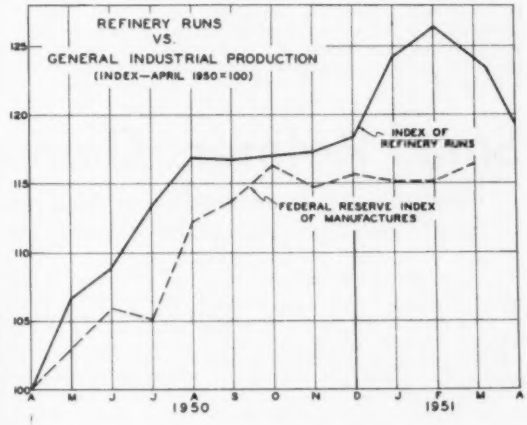
MATERIALS—Third-quarter steel allocation of 1,593,000 tons expected to permit continuation of drilling at present rate, to restrict construction of storage, laying of pipe lines, and expansion of refining facilities. . . . ¶NPC names committees to find substitute for quebracho, determine feasibility of underground products storage. . . . ¶W. S. S. Rodgers, Texaco chairman, says 1951 drilling rate may wind up below that of 1950 due to materials restrictions. . . .

REFINING—Cities Service, Firestone form new company to build petrochemicals plant at Lake Charles. . . . ¶Continental to begin construction late this week on $24,000,000 program to expand Westlake refinery near Lake Charles. . . . ¶Northwestern Refining Co. begins construction of 30,000-bbl. refinery at St. Paul Park, Minn. . . . ¶Coast Oil Co. takes over old Premier plant at Cotton Valley, La. . . . ¶California Co. completes Perth Amboy expansion, delivers first shipment of avgas to Air Force under new program. . . . ¶Study indicates need for annual refinery construction totaling 500,000 bbl. daily capacity for next 10 years to replace equipment being retired and to increase output. . . . ¶Quick-amortization certificates issued indicate small independents will play big part in construction program. . . .

NATURAL GAS—Drawn-out FPC hearing to determine status of Phillips Petroleum Co. under Natural Gas Act ends. . . . Briefs to be filed with FPC in Washington before June 22. . . . ¶Survey shows FPC approved construction of 7,618 miles of gas pipe lines in 1950. . . . Applications to build 15,866 miles still awaiting FPC consideration on January 1. . . . ¶Alberta Supreme Court rules petroleum does not include natural gas. . . . Holds that Imperial on lease in question may produce oil but may not interfere with gas in solution. . . .

TEST FOR NEW TOOL.—A down-the-hole exploratory instrument which tests have indicated may become an important tool in locating structures favorable to oil accumulation is here being lowered in a well on a test run. Developed by Magnolia Petroleum Co. research men, it is known as the magnetic-susceptibility logging instrument. The device determines basic magnetic properties of certain types of underground formations. One of its principal values appears to be in providing control data for interpretation of surface or airborne magnetometer surveys by telling the magnitude and extent of magnetic bodies. Heretofore it has been necessary to make certain assumptions regarding magnetic material in the earth and its environment before it was possible to determine the geological features represented by magnetic anomalies. For additional potentialities of this soon-to-be-available instrument *see page 145.*





Needed: More Refining

Replacement and expansion require construction involving daily capacity of 500,000 bbl. annually for next 10 years

John C. Casper

This is the second of a series by John C. Casper, associate editor, on new construction work facing the oil industry as a result of the increasing demand for petroleum products.

REFINERY construction equivalent to 20 new 25,000-bbl. refineries a year must be accomplished by the oil industry during the next 10 years—more refinery construction than in any decade in history.

This huge program is necessitated by three factors: Replacement of equipment wearing out, the rapid rise in civilian demand for petroleum products, and the special needs of the defense program.

Our situation.—Crude runs at United States refineries in the first quarter of this year were pushing closer to actual capacity than in any comparable period in the past decade.

For that quarter, capacity at operating refineries exceeded runs by only about 9 per cent.

This compares with a leeway as high as 32 per cent for the same quarter of 1943 and 10 per cent for the first 3 months of 1945, when refiners were meeting military demands for a two-front war as well as rationed civilian consumption.

The accompanying chart shows the difference between runs and capacity in the first quarter of each year expressed as a per cent of runs.

In the years following World War II, interest in refining technology centered around methods of improving quality of products, particularly gasoline.

Also, total refining capacity was gradually increased to meet demand for products to the extent that even as late as midyear 1950, the over-all capacity seemed sufficient to cover foreseeable needs for another year.

It was not until the rapidly expanding demands in the late months of 1950 pushed refinery runs to new high levels that the shortage in total refining capacity was generally accepted.

The second chart shows the large increase in refining in the past winter season and a comparison of changes in refining activity with the gains for manufacturing generally.

Total demand and crude runs increase during the winter months. Refining capacity should be at least 10 per cent greater than runs in the peak month.

What we need.—What increase in refining capacity will be needed in the next few years? Bruce K. Brown, deputy petroleum administrator of Petroleum Administration for Defense, says we must add 700,000 bbl. daily by the end of 1952 and 300,000 bbl. daily in each of the following 3 years. These goals are based on our present defense plans and would be insufficient if international tension increases.

Estimates of demand by H. S. M. Burns, president of Shell Oil Co., call for an increase of 2,000,000 bbl. daily in refinery runs by 1960.

These increases do not seem excessive when compared with the gains for the past 10 years.

Crude runs averaged 5,739,000 bbl. daily in 1950, up 2,203,000 bbl. daily or 62 per cent over the average for 1940. The same percentage increase between 1950 and 1960 would result in runs of about 9,300,000 bbl. daily or a gain of more than 3,500,000 bbl. daily for the decade.

From this data it seems that forecasters have set estimates of refinery increases for the next 10 years somewhere between the numerical increase and the percentage increase for the 1940-50 period.

Relatively large portions of the capacity increases reported for the past few years came through rearrangement of and minor additions to equipment already installed. This process of squeezing a little more capacity out of each plant has about reached its limit, and nothing remains but the actual construction of new units.

However, changes in product demand result in a continuing problem of equipment balance at refineries in order to meet these demands.

The list of refining facilities recommended for accelerated amortization by Petroleum Administration for Defense since last October *(The Oil and Gas Journal, May 24, page 76)* includes catalytic cracking and catalytic reforming units with capacities amounting to 553,035 bbl. daily compared with crude topping units totaling 527,966 bbl. daily. Increased demands for aviation gasoline and high-quality automotive fuel result in a disproportionate increase in equipment for the production of more and better gasoline.

Total construction needed.—The estimates of needed additions to refining capacity are net increases and do not include any construction required to replace retired units. The amount of retired capacity, reported by the Bureau of Mines for the 10-year pe-

riod ended 1948, averaged 205,000 bbl. daily per year or 4.5 per cent of total capacity at the beginning of the period. Even if this percentage drops to 4 per cent a year, the annual retirement rate for the next 10 years will be more than 250,000 bbl. daily, based on present capacity of almost 7,000,000 bbl. daily.

If we must rebuild 250,000 bbl. daily each year and need to add 250,000 bbl. daily to meet growing demands, the total construction program will involve a daily capacity of 500,000 bbl. each year. This is in addition to general maintenance required to keep existing equipment in working order.

Small Refiners Gaining

Independents to share heavily in refining construction over next 5 years, gaining ground lost after postwar period

George Weber

THE expansion and modernization of a great many small refineries will take place in the next 5 years.

In the coming plant-expansion program aimed at adding a million barrels daily to crude-processing capacity in this country, the independent refiner promises to play an important role.

New-construction projects recommended for accelerated amortization by the Petroleum Administration for Defense reveal a heavy degree of participation by operators of plants with capacities of less than 20,000 bbl. per day.

In addition, the base of important catalytic cracking will be greatly broadened to include many new refineries in the smaller size brackets. It appears that many independent refiners who lagged the field in postwar construction will now regain much of the ground they lost and should emerge with expanded and modernized facilities competitive with those found in the country's major refineries.

A complete tabulation of all refinery construction projects recommended up to May 11 *(The Oil and Gas Journal, May 24, page 76)* shows proposed expansion of basic refining facilities amounting to 527,966 bbl. per day, about half the current goal. Applications for the remaining half million barrels per day of capacity had been received by PAD by May 1, and further rapid-amortization recommendations are expected to be announced over the next several weeks.

In addition to basic refinery construction, PAD has recommended accelerated amortization for $36,150,330 worth of new facilities at 21 refineries to produce 23,560 bbl. of aviation alkylate and 957 bbl. of isobutane daily.

In the aromatics program, 12 refineries are slated to receive $27,102,829 in new equipment for manufacturing over 5,116 bbl. of benzene, 3,675 bbl. of toluene and 10,980 bbl. of aromatic base stocks daily. This segment of new construction will add over 78 million gallons per year to benzene production from petroleum. Superimposed on the existing capacity for an estimated 12 million gallons per year, this new construction program represents a total capacity approaching the initial goal for petroleum benzene production.

Small-plant construction.—Of the 527,966 bbl. per day in new crude processing capacity, authorized to May 11, 27 per cent is being added to refineries presently rated at less than 20,000 bbl. per day. This class of refineries today represents less than 19 per cent of total operating capacity.

Possibly of greater significance is the spread of catalytic cracking to a broader base of smaller refineries. Of the 40 catalytic cracking projects (excluding catalytic reforming) so far announced for accelerated amortization, 30 will be installed in new refineries or existing ones previously without such facilities.

Twenty-one units with total capacity of 125,700 bbl. per day, are slated for refineries of less than 20,000 bbl. per day crude capacity. This new construction compares with cat cracking facilities installed prior to the present program, amounting to but 91,500 bbl. per day in 20 plants of less than 20,000 bbl. crude capacity.

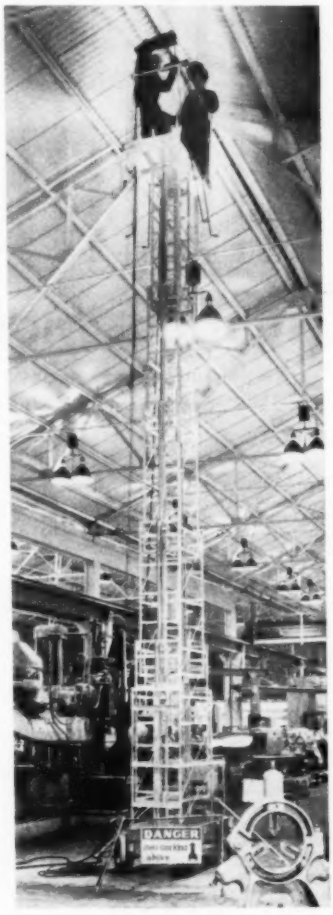
Thus the cat cracking potential of smaller refineries will be more than doubled on the basis of new construction plans announced to date. It should be noted that these figures pertain only to projects already processed by PAD. The smaller refiner is expected to figure largely in facilities yet to be approved by that agency.

Catalytic reforming.—The reverse appears to be true regarding catalytic reforming.

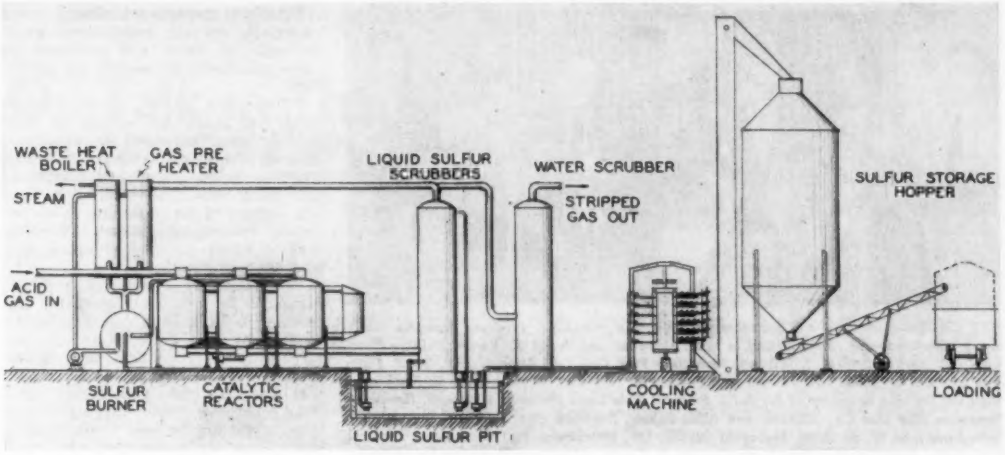
Small refiners were the first to adopt this new process in the form of Platforming, as a means for upgrading low-octane naphthas. Now, with catalytic reforming tied directly to the needed production of aromatics, the larger refiners are entering the field. Of this type of process thus far announced for early construction, over 60 per cent of capacity will go into plants of 100,000 bbl. per day and greater, as contrasted with less than 30 per cent slated for plants of less than 20,000 bbl. per day.

Majors heaviest investors. — Dollarwise, the bulk of new expenditures will go into large refineries, according to projects announced to date.

Of the total nearly $423 million slated for basic refining capacity, 45 per cent is earmarked for refineries with crude charging capacities of 50,000 bbl. per day or more. The bulk of this expenditure appears to be marked for expanded cat cracking facilities.



CHEAPER MAINTENANCE. — After trying out this 30-ft. telescoping scaffold, Magnolia Petroleum Co. has ordered two more for its Beaumont refinery. The company found the unit speeds up maintenance chores where often the erection of a scaffold would consume more time than the actual repairs. The steel structure is mounted on pneumatic tires and can be towed. A hand-operated crank connects to a cable and drum arrangement which lifts the platform to any height desired. It can hold a load of 600 lb. Several 15-ft. scaffolds were in use when the unit above was introduced.



PLANT LAYOUT.—Shown here is a generalized flow diagram for a plant using the new sulfur-recovery process.

New Sulfur Process

Method recovers all sulfur from either sour field gas or refinery gas with 1 to 30 per cent hydrogen sulfide

F. Lawrence Resen

NEW ORLEANS.—A new, low-temperature, catalytic oxidation process for recovering elemental sulfur from petroleum gases containing hydrogen sulfide has been announced by Jefferson Lake Sulphur Co., New Orleans.

The process can be used equally well either with sour natural gas as received from the field or with refinery gases containing sulfide, according to the company.

Tests in a pilot plant have resulted in virtually complete removal of sulfur from natural gases containing from 1 per cent to more than 30 per cent hydrogen sulfide. The method is said to be well suited to the recovery of sulfur from acid refinery gases obtained from any of the conventional amine-absorption systems.

Significance.—Sulfur is an undesirable constituent of many crude oils and natural gases, and various removal processes are in use. Formerly the main objective was to get the sulfur out, but in recent years there has been a growing interest in its recovery in the form of a marketable byproduct, usually elemental sulfur.

At present there is a world-wide shortage of sulfur for all uses, and demand is at record levels in the United States due to the defense program. This has heightened interest in the possibilities of developing an important commercial source of sulfur from petroleum and natural gas, and the Petroleum Administration for Defense has asked the oil industry to construct additional recovery plants. The Jefferson Lake process may be an important contribution to this activity.

How it works.—In the Jefferson Lake process, a specially developed catalyst combined with a novel reactor design makes possible the conversion of hydrogen sulfide to sulfur from any concentration of acid gas in the presence of either inert or hydrocarbon diluent gases.

Sulfur dioxide is obtained by recycling a portion of the sulfur produced back to a spray-type sulfur burner and this is used to oxidize the hydrogen sulfide in the gas mixture according to the reaction:

$$2\,H_2S + SO_2 \rightarrow 2\,H_2O + 3S$$

Heat generated in the sulfur burner is utilized for the production of steam and any necessary preheating of gases in the system.

The usual procedure of burning a portion of the acid gas input to provide the SO_2 is eliminated by burning sulfur direct to the dioxide. This not only eliminates formation of water vapor and other combustion products when hydrocarbons are present, but also avoids subjecting the treated gas to high oxidizing temperatures. Hydrocarbon gases may pass through the recovery plant without injury under such an arrangement.

Typical plant.—In the accompanying illustration one arrangement of a Jefferson Lake sulfur-recovery plant is shown, with sour gas entering at the left and elemental sulfur leaving at the right.

The plant layout shown is a four-stage system with condensers for removing the liquid sulfur after the second and fourth stages. Several catalytic reactors are employed in series in this process. Six reactors are shown in two groups of three.

A continuous regenerative cycle is maintained by an automatic programing system which shifts the flow of gas at predetermined intervals. Two reactors of each group are thus in service at all times while the third is being reactivated to maintain optimum catalyst efficiency.

Makes flakes.—The plant gets away from the conventional method of pumping the liquid sulfur to a vat where it solidifies. Instead, sulfur is cooled on a special machine to solid flakes about ½-in. thick. These flakes are practically dustless and are suited for grinding, remelting, or other subsequent use of the sulfur.

The flakes may be loaded directly into cars for shipment or stored in an elevated steel hopper. Current production may thus be shipped immediately, whereas, in the conventional vat-cooling method the sulfur must be broken up before being shipped or reused.

Chemical Construction Corp. has entered into an agreement with Jefferson Lake Sulphur Co. to build sulfur-recovery plants using this process.

PIPE LINERS.—Speakers and pipe-line executives at the A.P.I. Products Pipe-Line Technology Conference in Atlanta. Left to right, standing, are David A. Roach, Phillips Petroleum Co., Bartlesville; M. J. Dabney, Plantation Pipe Line Co., Atlanta; J. P. West, Sohio Pipe Line Co., St. Louis; Lewis F. Scherer, Texas Pipe Line Co., Houston; Hugh E. Dischinger, Shell Oil Co. and secretary of the A.P.I. Products Pipe Lines Division; Walter G. Horstman, Plantation Pipe Line Co., Atlanta; and Allen Baxter, Keystone Pipe Line Co., Philadelphia. Seated are John W. de Groot, Tuscarora Oil Co., Ltd., Harrisburg, Pa., conference chairman; S. S. Smith, Shell Oil Co., New York; Charles R. Younts, Plantation Pipe Line Co., Atlanta; and B. W. Winters, Southeastern Pipe Line Co., Atlanta.

Growing "Infant"

Products lines being laid at annual rate of 1,600 miles; increase in pipe-line movement of L.P.G. is predicted

Paul Reed

ATLANTA.—Products pipe lines, referred to as the "infant of the oil industry," have been constructed in the postwar period at an average annual rate of 1,600 miles. Now there are altogether approximately 23,000 miles in operation.

Practices for converting crude-oil lines to products service and the techniques of filtering, scraping operations, storage and fire-fighting were discussed here at the second annual American Petroleum Institute Technology Conference attended by 240 engineers and executives representing nearly all the products pipe lines in the country.

It was predicted that products pipe lines will be the principal means for transporting light, refined products because of their low cost, convenience and the savings effected in evaporation losses and handling expense. Deliveries now exceed 1,200,000 bbl. daily.

L.P.G. movement.—Movements of L.P.G.—the "pipe line orphan"—are now believed to represent less than 10 per cent of the total volume marketed.

Trends toward more pipe lining of L.P.G. indicate an early increase of 30 per cent with the eventual prospect that L.P.G. will become a full-sized brother in the regular lineup of products moved by products pipe lines.

High costs of L.P.G. storage mean that frequent pumping of comparatively small slugs is an economic necessity.

Field trip.—During a field trip, the pipe liners visited the important Bremen, Ga., junction terminal of Plantation Pipe Line Co., where construction was observed for extending the pump house to a new length of 259 ft. and for the installation of the 200-ft. manifold. Both of these will be unusually long.

This work is being done in connection with the laying of the parallel 18-in. and 14-in. lines to raise throughput to 221,000 bbl. daily. Plantation's plans for installing strain gages to supplant conventional bourdon tube gages in the control rooms are a significant innovation in pipe lining.

At Southeastern Pipe Line Co.'s Chattahoochee, Ga., terminal station, a 1½-minute demonstration of fog foam which cost $125 in materials expended, showed the group how this unique method is applied.

Idea exchange.—The value of exchanging ideas was illustrated by the discovery made during the conference by Plantation, Magnolia Pipe Line Co., and Tuscarora Oil Co., Ltd., that they have been simultaneously and independently engaged recently in the development and application of magnetic filters for the removal of rouge from products transported by pipe line.

Squeegee scrapers are being run occasionally for the removal of small amounts of water and sediment in lines satisfactorily served by inhibitors.

"Grounding grids" which would float just below the surface of tank liquids were proposed to eliminate hazards due to static during filling of gas-free tanks. A dial type thermometer hung near the center of a tank was suggested for obtaining more accurate temperature data. Attention was directed to new folding diaphragm-type tanks.

Predictions of interfacial commingling can be accurately predicted according to Plantation practices when applied by personnel trained in rigidly uniform procedures for regular established operations.

It was also cited that certain systems operating under varying conditions might not be able to make such predictions. In connection with this, it was pointed out that there are actually no true interfaces between batches since there is a gradual gravity change.

J. W. deGroot, president, Tuscarora Oil Co., Ltd., presided at the conference. L. F. Scherer, assistant manager of construction and engineering, Texas Pipe Line Co., was moderator of the panel discussion. Informal-group round table discussions of different subjects were a new feature of the conference.

Next year the A.P.I. products pipeline conference will be held on April 21-23 at the Blackstone Hotel, Fort Worth.

Petrochem Plant

Cities Service, Firestone form new firm for venture

BARTLESVILLE, Okla.—Cities Service Oil Co. has joined with Firestone Tire & Rubber Co. to form American Petrochemical Corp. for the manufacture of essential petroleum-derived chemicals.

A site at Lake Charles, La., is now under consideration for the construction of a large modern plant which will ultimately produce plastics, lubricating-oil additives, cracking catalysts, antifreeze, and many high-volume petrochemicals.

Obtaining light hydrocarbons from the 160,000 bbl. per day Cities Service refinery at Lake Charles, the new plant would comprise another unit in the group which now includes the major basic refinery, the Cit-Con lubricating oil refinery, a butadiene plant, and a Firestone-operated government - owned synthetic - rubber plant.

Each company has a half interest in the new enterprise. It is believed

that the proposed new plant will employ several processes for the direct oxidation of hydrocarbons, which were originated 20 years ago by Cities Service at Tallant, Okla.

An established plastics producer, Firestone is also a pioneer in synthetic chemistry—producing the first synthetic rubber under the Government's World War II program and furnishing the first synthetic rubber tires to the Army Air Force.

Oil Talk in The Hague

International developments being studied at Third World Petroleum Congress; 2,000 participating in discussions

Kenneth B. Barnes

THE HAGUE.—New developments in international oil activities and technology are being covered, country by country, here in the Third World Petroleum Congress.

The international flavor of the big meeting is the most striking thing to the senses of visiting oil men.

While more than 2,000 are attending, the meeting is an entirely different affair than the national meetings of the American Petroleum Institute and other industry organizations in the United States.

Both the first day and all continuing impressions of the Congress have been the contrasts between United States oil operations and those abroad, as represented by the current W.P.C. proceedings.

Procedure.—Operation of the Congress is unusual. At the sectional meetings for each subject every endeavor is made to reserve as much time as possible for discussion of the individual papers.

Seven pages of digests of important papers being presented at the Third World Petroleum Congress may be found in this issue beginning on page 95. An additional seven pages of digests will appear in the June 7 issue.

Neither the papers themselves, nor summaries of them, are permitted to be read by the authors. Instead, these papers at the particular sectional meetings are introduced by one of the "rapporteurs" in a general summary lasting 10 to 15 minutes.

These "rapporteurs" are expert technical linguists who beforehand have been especially briefed on the papers. In this summary, particular emphasis is laid on those points which, by the principles they raise or by their controversial nature, form suitable material for discussion. Interpreters are present at each meeting so that both English and French-speaking delegates may follow the discussion and take part in it.

Developments in drilling.—One paper stressed the advantages of incorporating torque converters with continuous blade adjustment in mechanical drilling rigs, this adjustment leading to a much more efficient drive at a more or less constant speed of the engines. Two reports dealt with the testing of tubular material; one on the merits of internal hydraulic testing, while the other discussed tension testing experiments on drill pipe with specialized equipment.

Cementation practices and procedures were reviewed up to the most recent developments. One author suggested standards for testing casing centralizers. Another contribution gave a classification of geological formations according to their drillability, and also of types of drilling bits with respect to these formations. Latest developments in directional drilling, the use of shaped charges for perforating, orientated side-wall coring and internal drill-pipe cutting, were discussed.

Advances in production.—Reservoir engineering has been more and more developed into a special science since the last Congress. Therefore, a considerable part of this session discussed methods of solving such problems as: Interpreting rate of buildup of closed-in bottom-hole pressures, and correcting observed surface readings to obtain accurate bottom-hole data; methods for calculating the results of cycling and water-flooding operations (patterns); and analysis of water cuts and interpretation of data obtainable from formation tests.

Industry Briefs

DENVER.—C. D. Edmonson, Denver independent, together with Kansas-Nebraska Natural Gas Co., has purchased the interests of J. T. Speake, of Sidney, Neb., in Big Springs field of Deuel County, Nebraska. The deal involved the discovery well and about 2,000 acres of land. Speake retained a one-sixteenth override.

BATON ROUGE.—Oil operations in Louisiana were at a less active pace in April, according to the state conservation department. Drilling permits dropped from 209 in March to 191, and well completions were down from 190 to 135. Fourteen wildcats were completed during the month, with 64 more either drilling or on location.

OKLAHOMA CITY.—Sunbeam Oil Co. has been formed under a Delaware charter to operate in southern Oklahoma. Officers are G. B. Howell, president; Robert J. Beams, vice president and chief geologist; Vernon Howell, vice president; and Walter Duncan, Jr., secretary-treasurer. The Howells operate rotary tools in Oklahoma and have production in Oklahoma and the Texas Panhandle. Duncan, an independent operator, has production in Oklahoma, Illinois, and West Texas. Beams formerly was with Shell Oil Co. and more recently a consulting geologist here.

LONDON.—Construction is under way at Birkenhead on two $4,200,000 tankers for Standard Vacuum Oil Co. The first ships to be built in Britain for the Standard fleet, the ships will be among the world's largest and fastest tankers. They are the first of six ships ordered by Esso Petroleum Co., British affiliate of Standard.

PORT ARTHUR, Ont.—The largest tanker to operate on the Great Lakes has been hauling Alberta oil from Superior, Wis., to the Sarnia refinery of Imperial Oil, Ltd. Built by Imperial, the ship was christened the Imperial-Redwater when it was launched here in mid-May.

WICHITA, Kans.—Kansas' June allowable has been set at 300,000 bbl. daily, the same as that of May. The figure is 10,000 bbl. greater than the allowables ordered for Kansas fields from July 1950 through April of this year.

SAN FRANCISCO.—The trend toward use of diesel-powered trucks is still sharply upward in 1951, H. B. Ford, General Motors Corp., told the Northern California Section of the Society of Automotive Engineers meeting here. In 1938, he said, diesel truck sales totaled 489; in 1946 they were up to nearly 2,000; and in 1950 they had climbed to 12,669.

BATON ROUGE.—Louisiana's June allowable has been set at 643,563 bbl. daily, an increase of 4,816 bbl. daily over that of May. S. L. Digby, conservation commissioner, estimated June crude production at 609,563 bbl. daily with other hydrocarbons adding 48,000 bbl. a day.

FINDLAY, Ohio.—Ohio Oil Co. plans to drill 33 wildcats, 319 development wells, and 209 wells in secondary-recovery projects this year. Company stockholders meeting here were told by officials that the 1951 capital outlay will exceed the $31,481,000 spent in 1950.

Gas-Line Survey

Construction outlay, mileage still climbing

NEW YORK.—The Gas Appliance Manufacturers Association has made public its fourth annual compilation of natural-gas construction data from records of the Federal Power Commission.

The survey shows that, from July 1, 1945, to January 1 of this year, FPC authorized 34,141 miles of natural-gas pipe lines. The projects approved during this period involved construction valued at $2,314,318,000.

During 1950, total over-all authorizations by FPC involved expenditures of $632,201,000 and included 7,618 miles of pipe line. In 1949, according to the G.A.M.A. study a year ago, 7,537 miles of new line and expenditures of about $600,000,000 were authorized.

Lines pending.—Pending before the commission on January 1 of this year were applications involving expenditures of $943,640,000, including 15,866 miles of new transmission lines which would require 3,114,300 tons of steel pipe.

Despite the tremendous construction of gas lines last year, the projects pending before the commission at the beginning of this year were greater than a year ago. On January 1, 1950, pending applications included 12,700 miles of line requiring an estimated 2,460,800 net tons of steel and involving expenditures of $873,936,000.

Postwar expansion.—The magnitude of the postwar expansion in natural gas is shown in the total of all applications. The compilation showed that all FPC authorizations since July 1, 1945, conversion of the Inch systems, and pending applications as of January 1 of this year involved 49,997 miles of gas line requiring 10,849,300 tons of steel pipe with expenditures of $3,257,958,000.

The G.A.M.A. compilation detailed larger projects and in general did not include numerous smaller projects before the FPC costing less than $250,000. Exclusive of these and the converted Inch systems, the study listed 29,875 miles of the 34,141 miles of line authorized in the last 5½ years. These listed projects required 6,768,300 net tons of steel pipe ranging from 2 to 34 in. in diameter.

Completed lines.—Of the 29,875 miles of line authorized, 17,621 miles, which required an estimated 3,757,100 tons of steel, are completed and operating. The total cost of these completed projects was $1,017,189,000.

Included also in the 29,875 miles authorized are 12,254 miles requiring 3,011,200 tons of steel for which completion notices had not been filed as of January 1 of this year. These projects, calling for expenditures of $1,001,332,000, are in various stages of construction.

Process Problems

Four papers presented at annual heating seminar

TULSA.—"The major problem of the refiner is how to balance available feed against possible products." P. M. Reynolds, process engineer for Mid-Continent Petroleum Corp., told 300 engineers attending the second annual Process Heating Seminar of John Zink Burner Co. here last week.

Discussing cat cracking feedstocks on the basis of relationship of boiling range to carbon formation, Reynolds said, "It usually is advisable to feed all clean cracking stocks through a catalytic unit, maintaining maximum coke burning at all times.

"This sometimes means that low conversion must be maintained and large volumes of cat cycle oils produced to be further handled on a thermal unit. Highest yields are obtained in this manner by catalytic cracking first.

"Higher octanes and less No. 6 fuel oil are produced. The price of burner fuels and gasoline has an important bearing on the splitup of the cycle oils into burner fuel and thermal cracking charge."

Transfer of radiant heat in process furnaces received a new treatment in a paper read by Prof. A. P. Buthod, of the School of Refinery Engineering, University of Tulsa. The approach to a complex problem as shown by Buthod was unique in a field which has been more or less "cut and dried" for many years.

Firebrick and other refractory materials used in the erection and maintenance of furnaces was the subject of a paper by Ray Witschey, ceramics engineer with A. P. Green Firebrick Co. R. H. Hayman, senior engineer, W. H. and L. D. Betz Co., Philadelphia, presented a talk on the treatment of water used in the process industries. The use of water as boiler feed and for cooling was dealt with and the methods used in preventing scale formation and elimination of fouling by algae.

The technical portion of the seminar ended with a question-and-answer session before a panel of experts representing Born Engineering Co., C. F. Braun Co., Girdler Corp., M. W. Kellogg Co., Koch Engineering Co., Petro-Chem Development Co., Refinery Engineering Co., Universal Oil Products Co. and other organizations.

Drilling Records Questioned

HOUSTON.—"It is very doubtful if the industry will be able to drill as many wells this year as in 1950," W. S. S. Rodgers, chairman of the board of The Texas Co., said here last week.

Here to attend a board meeting, Rodgers said that the company would like to drill 20 to 25 per cent more wells than last year. However, the critical shortage of tubular goods will probably make this an impossible goal.

He said domestic pipe mills are operating at full capacity and that imported pipe is the only way to alleviate the situation. He added, however, that foreign pipe is very expensive and that Texaco is not buying any yet.

Rodgers said that The Texas Co. is anticipating a manpower shortage on top of the present materials shortage. He said 700 of the company's 32,000 domestic employes already have been called to the service. A shortage of technicians is particularly feared by the company.

WITH THIS ISSUE

Golden Anniversary Supplement

MAILED to all subscribers with this May 31 issue is the Golden Anniversary Number of The Oil and Gas Journal, a 484-page, separately bound volume commemorating 50 years of oil in the Southwest and a half-century of service by the Journal.

Nearly a year in preparation by the Journal's editorial staff, the volume gives a running account of the highlights of the development of all branches of the petroleum industry. An oil history for oil men, it is designed for easy reading and is profusely illustrated with old and modern photographs selected from the files of the Journal and oil and equipment companies throughout the Southwest.

A history of the men and methods that made the industry, it reviews in narrative form the technology, geography, and economics of the industry's divisions and activities, and lists some of the personalities who have made outstanding contributions over the years. The story of the Journal itself forms one of the major chapters, interwoven with the history of the industry to show the significance of the trends and events which influenced the progress of petroleum during half a century.

Third-Quarter Steel

Oil industry allocated 1,593,000 tons; drilling program to be unaffected, but pipe lines, refineries may suffer

WASHINGTON.—Third-quarter allocations of steel for the oil and gas industry will be close to 1,600,000 tons.

This will be nearly 440,000 tons less than the Petroleum Administration originally asked of the National Production Authority.

PAD's steel quota includes 450,000 tons of oil-country tubular goods, 180,000 tons for oil-field machinery and equipment, specifically set aside for those purposes by NPA, and 963,000 tons for all other requirements, a total of 1,593,000 tons.

Despite rumors that the steel situation may improve during the next few months, PAD officials believe that fourth-quarter quotas may be even less than those for the coming quarter, pointing out that the impact of military orders is becoming more severe. The first quarter of 1952, they believe, should bring some slight improvement, with possibly more to come thereafter.

Where it goes.—While the oil and gas industry is to get close to 1,600,000 tons of steel for the 3 months beginning with July, that is merely a paper figure. Whether it will actually be available will depend upon the extent of slippage between what is set up and what will really be run by the mills. This is a variable and unpredictable factor which cannot be discounted in advance.

A total of 351,000 tons of the 450,000 tons of tubular goods earmarked for the quarter already has been parceled out to some 4,000 oil and gas operators.

Of the remaining 99,000 tons, 40,000 tons of casing, tubing, and drill pipe has been set aside for export to countries other than Canada; 13,200 tons has been reserved for Canada; 22,200 tons of casing and tubing has been assigned to wildcat emergency field stocks; 21,000 tons of drill pipe has been set up for domestic drilling programs; and 2,000 tons of casing, tubing, and drill pipe has been earmarked for sulfur, brine, and miscellaneous wells.

Effect on industry.—The 450,000 tons of tubular goods is seen by PAD as permitting continuation of the 43,400-well program and the 180,000 tons for oil-field machinery and equipment sufficient to keep the industry going although far from satisfactory.

But other operations, particularly the construction of storage, the building of long oil and gas pipe lines, and refinery expansion, will be severely squeezed, pipe-line construction especially since it will be necessary for PAD to provide material for completion of lines already partially built and for the laying of gathering and distribution lines.

There are indications that a number of natural-gas pipe-line projects will have to be shelved in the near future because of the necessity of providing gas supplies for more vital areas, but at the same time new orders shortly to be issued will insure that when a project is approved it will be given not only the line pipe required but everything else needed for its construction, thus eliminating any uncertainty over completion of a project for lack of any material or equipment.

The new order will cover all projects in the oil and gas industry coming under PAD authority, and is one of several now being perfected.

Attempting Rejuvenation

Cleanout rigs such as this one are a common sight today in the Juanita area of Placerita Canyon, Los Angeles County, as operators recondition some wells and drill others deeper in an effort to bolster their flagging production. Discovered in February 1949, the pool was quickly over-drilled and over-produced—in the 60-acre "hot-spot" to a density of more than 1 well per acre. Peak daily production of about 35,000 bbl. was reached within 8 months after the discovery, and since then it has continually declined despite additional but wider-spaced drilling. The pool's current daily output, from 200 wells, is less than 7,500 bbl.

Oil Studies

Committees named to find quebracho, storage answer

WASHINGTON. — Two important investigations affecting national defense have been started by the National Petroleum Council.

A committee has been appointed by Chairman Walter S. Hallanan to study the feasibility of underground storage for petroleum products, including liquefied petroleum gas. The committee will be headed by H. S. M. Burns, president of Shell Oil Co., New York.

Another committee, to be headed by John R. Suman, vice president of Standard Oil Co. (N.J.), New York, will investigate the possibilities of using chemicals or other additives as substitutes for quebracho in drilling mud and determine the availability of such substitutes.

The storage investigation was requested by the Interior Department to determine whether resort to underground space would reduce the oil industry's steel requirements, add

needed storage capacity, and be less vulnerable to enemy attack.

Quebracho study. — The search for substitutes for quebracho was initiated more than a year ago at the suggestion of the Munitions Board. The United States is dependent upon Latin America for the material, which is equally important in the tanning of leather.

The original study developed suggestions on the possible use of a number of substitutes by the oil industry, but so far no adequate substitute has been found in sufficient assured supply to relieve the concern of the military over the results of possible interruptions or deficiencies in the supply of quebracho.

L.P.G. study.—Hallanan also has appointed a committee headed by W. K. Warren, chairman of the board of Warren Petroleum Corp., Tulsa, to make a study of the availability, adequacy of transportation facilities and minimum materials required for the production and transportation of liquefied petroleum gas.

Purpose of the study is to provide data on which steps may be taken to prevent a recurrence of the spot shortages of L.P.G. that occurred last winter or minimize the effects of situations that may arise.

Defense Orders

WASHINGTON.—The following orders have been issued by defense agencies:

National Production Authority

Amendment to M-1, May 18: Placing a floor of 90 per cent on deliveries of carbon steel products, except plates for line pipe, made by a producer supplier to a converter customer.

Amendment to Regulation 4, May 22: Increasing the amount which may be spent to acquire maintenance, repair and operating items on DO-97 ratings to 120 per cent of the amount spent on such items during the base period.

Delegation 12, May 23: Authorizing the Office of International Trade to assign DO ratings for the procurement of controlled materials for export.

Defense Production Administration

DPA Order 1, May 24: Designating agencies to estimate basic material requirements under the Controlled Materials Plan.

PAD Gives Up Coke Control

WASHINGTON. — Authority over the distribution of petroleum coke has been surrendered by the Petroleum Administration for Defense to the Defense Solid Fuels Administration. However, the latter will be required to exercise control in conformity with production policies and programs laid down by PAD.

WATCHING WASHINGTON

Bertram F. Linz

Expendable "Inch"

Quick completion of some very important defense plants now under construction is threatened by a shortage of equipment and consideration is being given in Washington to suggestions that the Big and Little Inch pipe lines be stripped of their standby oil-pumping equipment to meet this need.

When the war-built lines were sold by the government for gas operation, the contract contained a recapture clause under which the purchaser was required to maintain the oil-pumping equipment in such condition as to enable it to be reactivated in a period of 3 or 4 months in the event an emergency required reconversion to petroleum service.

A decision apparently has been reached that reconversion of the Inch lines would be impracticable and that any need for oil in the area served by them could best be met by laying a third pipe line along the Big Inch right-of-way. That decision paved the way for the idea it might be possible to use some of the idle oil equipment where it can be put to work almost immediately.

The question of Big Inch reconversion has been under study for many months as a possibility in the event of war. Studies, however, showed that important defense industries and many communities along the line are dependent on gas for fuel and could be switched to oil only at a tremendous expense in money and materials. The consequent disorganization would far out-weigh any advantages resulting from speedy reconversion of the lines.

Miserly DPA

There has been a lot of criticism of the alleged generosity of the Defense Production Administration in granting certificates of necessity for accelerated amortization of defense plants. But when the smoke clears away it is probable it will be found that only a small percentage of applications for tax concessions have been granted.

Close to 18,000 applications for projects totaling around $18,000,000,000 have been filed so far, but only around 1,500 have been approved. The approved projects involve an aggressive investment in access of $5,500,000,000, but the certificates issued provide for accelerated amortization for some $4,000,000,000 of this, the average being 70.6 per cent of estimated investment.

The proportion of applications granted is greater for the oil industry than for industry generally. Some 260 applications have been filed covering an estimated investment of around $1,200,000,000, and about 50 per cent of them have been approved, involving an investment of about $600,000,000.

Scrap Needed

Tip-off on next winter's steel production will be the stockpile of scrap developed this summer. And the scrap situation, so far as the long-term outlook is concerned, is almost desperate. Unless reserves are accumulated, steel mills will be in serious difficulty before the end of the year.

The National Production Authority has started a scrap drive, and has enlisted the oil industry's aid in beating the bushes for discarded iron and steel. It has not called on householders for contributions yet and hopes to avoid that cumbersome method, but is holding it as a last resort.

Turning Tide

Indications are that the National Petroleum Council will be permitted to go along during the emergency under the chairmanship of an industry man, even though all other bodies in an advisory capacity to the defense agencies may be put under full-time government officials as provided in the Defense Production Act.

For many months, Interior Secretary Oscar L. Chapman has been fighting with the Department of Justice to get approval of continuance of the council as now set up. Justice officials, however, were adamant in their demand that Walter S. Hallanan, present chairman, be replaced by a government official. They refused to recognize Chapman's contention that the NPC is not in the same position as an industry-advisory committee set up by a defense agency but a cooperating group making studies for the government while not attempting to advise how the results of its studies should be applied.

Chapman finally took his troubles to the White House where, apparently, he secured President Truman's support. Truman's views, transmitted to Atty. Gen. J. Howard McGrath, may serve to settle the controversy.

Production Fears

Chapman warns reserve producing capacity has dropped to "dangerously low level," hands problem to PAD division

WASHINGTON.—Interior Secretary Oscar L. Chapman called on producers this week to exert every effort to build up a cushion of crude capacity against an emergency.

"The country's excess capacity to produce crude oil has declined from over 1,000,000 bbl. a day in the summer of 1950 to less than half of that figure today," Chapman said.

"In other words, the pinched-in capacity of existing wells which is available, at maximum efficient rates of production, for quick use in an emergency has reached a dangerously low level."

With the demand for products rising more rapidly than crude productive capacity, the secretary said, the task confronting PAD's production division in aiding the nation's 18,000 producers to expand their operations is significant.

"Despite the short supply of steel and other materials needed for drilling oil and gas wells, every effort must be made to discover new reserves and to build up the nation's capacity to produce crude oil, so that the backlog of unused productive capacity will be large enough to meet any emergency demands," he declared.

"This means that exploration for oil must be intensified, drilling rates must be sustained at the highest level possible with the materials available, oil-field operations must be conducted with the greatest possible efficiency, and secondary-recovery operations must be extended wherever possible."

Men with the job.—PAD's production division, not yet fully organized, is headed by Richard G. Lawton, formerly an independent oil producer at Magnolia, Ark., who severed his active connection with Lawton Oil Corp. in January to join the government agency. Millard K. Neptune, formerly manager of the foreign department of Continental Oil Co., is assistant director of the division, and Paul B. Whitney, formerly with Continental Oil Co., Repollo Oil Co., and The Texas Co., and president of the Wolverine Natural Gas Corp., Grand Rapids, who joined the Oil and Gas Division in February 1949, as assistant to the director.

For the oil operators, the most important segment of the division is the drilling, production, and materials branch which is responsible for developing the materials requirements of producers and standards governing the distribution of oil country tubular goods and for distributing those materials under NPA Order M-46 and developing programs to promote more efficient oil field management.

Ralph D. Curtis, formerly vice president in charge of production for Murphy Corp., El Dorado, Ark., is chief of the branch, in which also Merle A. Sparks, former senior petroleum engineer for the southwest division of Sun Oil Co., Dallas, and D. R. Teis, former materials supervisor for the western division of Creole Petroleum Corp. in Venezuela, are staff members.

Not yet fully staffed, an exploration and reserves branch is responsible for developing programs to apply geology, geophysics and petroleum engineering to promote discovery of new oil and gas fields, determine production capacity and reserves of known fields, and promote maximum efficient recovery.

Edmund C. Babson, former assistant chief petroleum engineer for Union Oil Co. of Cal., Los Angeles, is acting chief of the branch, with Malcolm K. Mitchell, consulting geologist, Washington, as staff member.

A programs and economic branch not yet activated will be responsible for analyzing economic and other data relating to the availability of crude oil.

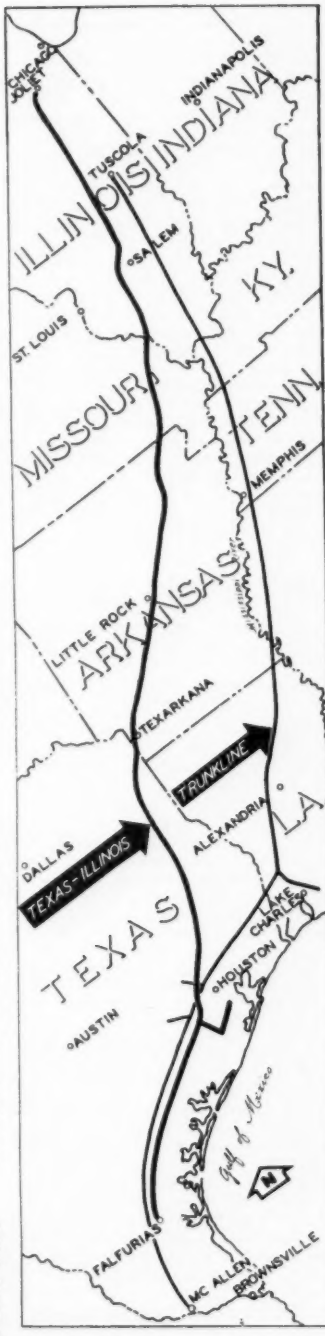
PAD Fills Posts

WASHINGTON.—William H. Farrand, Larchmont, N. Y., who has been serving as a consultant for the past month, has been named director of the foreign production division of the Petroleum Administration for Defense.

Farrand, who was vice president of American Overseas Petroleum Co. from 1944 to 1947 and since 1948 has been general manager of the foreign producing department of The Texas Co., will serve the government without compensation.

Three other PAD posts also have been filled with the appointment of Lloyd O. Zapp, senior supervising civil engineer for Humble Oil Co.,

Parallel Gas Lines



Two major natural-gas pipe lines are now under construction from the Gulf Coast area to Illinois markets—Texas Illinois Natural Gas Co.'s 1,331-mile, 30-in. line, and Trunkline Gas Co.'s 1,400-mile, 20-26-in. system. Both will begin transmitting fuel this fall to the Chicago metropolitan area and the East Central Illinois region. Another gas line is also being planned to serve the Chicago area. The newly formed Gulf-Michigan Gas Transmission Corp. will construct a 700-mile, 30-in. artery from Monroe, La., to Michigan City, Ind., with deliveries scheduled to begin the latter part of 1952.

Houston, as chief of the projects branch, serving without compensation; Hugh R. Lamberth, formerly sales manager of the Refinery Maintenance Co., Inc., Tulsa, as chief of the gas-materials branch to succeed Charles E. Webber who was named director of the natural-gas production and processing division last month; and Clarence C. Watson, Jr., formerly materials coordinator for the Trans-Arabian Pipe Co., New York, as assistant chief of the foreign-materials branch.

The projects branch is a new section of PAD, set up to work with the operating petroleum divisions in developing programs for construction of new facilities needed to assure production of required supplies of oil and gas and in determining the quantities of materials, equipment, and facilities required for completion of approved oil and gas projects. In addition it will develop procedures, in cooperation with the National Production Authority and other agencies, to assure scheduled delivery of materials and equipment and expedite delivery of bottleneck items.

DPA Checks Up

Quarterly filing required on amortized construction

WASHINGTON.—More than $5,500,000,000 of plant construction for which certificates of necessity for accelerated tax amortization have been granted is being reviewed by the Defense Production Administration to gage the progress of industrial expansion for defense.

Included in the more than 1,200 projects on which the DPA will compile information are some 122 in the oil industry representing an eventual investment in excess of half a billion dollars.

Information sought.—To keep abreast of defense construction, the DPA will require all holders of certificates to submit quarterly reports on Form DPAF-1. These reports are to show the exact location of the new facility; construction contracts awarded; revisions of estimated costs of each project; value in place at the end of the quarter; added capacity for specified products which will be available upon completion of the project; existing capacity that has been or will be shut down or dismantled as a result of disruption during the expansion program; existing capacity for each specified product that will remain in operation during the expansion.

One of the purposes of the quarterly check on construction is to assure compliance with those provisions of the accelerated-amortization program stipulating that the tax concession shall not be extended after the capacity to meet the mobilization program has been achieved. That point already has been reached in the case of basic refining facilities and the Petroleum Administration is no longer recommending the granting of certificates for such plants.

New certificates.—During the week ended May 18, DPA issued certificates for 81 new or expanded defense facilities. These included one to Phillips Oil Co. for 75 per cent amortization of a $40,766 project for gasoline production at Sweeny, Tex., and another to Southland Oil Corp., for 70 per cent of a $450,080 petroleum-storage project at Savannah, Ga.

The Defense Transportation Administration also has announced the issuance of more certificates for transportation and storage facilities. They were issued to: Tank Barge 14, Inc., San Francisco, 80 per cent of $239,501 for a steel oil barge; Atlantic Coast Terminals, Inc., New York, 85 per cent of $1,478,516 for steel storage tanks; Alamo Water Transportation Co., Houston, 80 per cent of $223,600 for barges, and Patterson Oil Terminals, Inc., Philadelphia, 85 per cent of $725,000 for storage tanks.

WEST COAST

Coalinga Sale

Unit to pay 10,000,000 bbl. of crude for lease

LOS ANGELES.—Coalinga Nose Unit, a seven-company unitization coalition, has purchased Binkley-Nidever lease in Coalinga Nose oil field from Universal Consolidated Oil Co., it was announced last week.

Universal, in return for relinquishing the 80-acre lease to the new operator, will receive 10,000,000 bbl. of crude deliverable in equal monthly quantities over a 10-year period. Universal will be paid an additional $528,000 for lease facilities and equipment.

The lease now has six producing wells and has produced approximately 7,000,000 bbl. of oil during the last 12 years, the company said.

Lying on the southwestern edge of the Fresno County field, the lease was not included in a pressure-maintenance program now under way by the Unit. Initiated in April 1950, gas-injection activities in the unitized area were suspended last January, because crude was being driven down-structure to the former Consolidated properties.

Companies participating in the Coalinga Nose Unit are Standard Oil Co. of California, Superior Oil Co., The Texas Co., Honolulu Oil Corp., Seaboard Oil Co., McAlester California Oil Co., and Los Nietos Co. The latter, a wholly owned subsidiary of Union Oil Co., is the operator.

The companies were said to have met Consolidated's terms, at a total cost in excess of $25,000,000, in order to continue the injection program.

CANADA

What's Petroleum?

Important decision holds it doesn't include gas

EDMONTON.—The Alberta Supreme Court last week dropped a bombshell into the Canadian oil industry.

It ruled that petroleum does not include natural gas. It held, specifically, that companies holding "petroleum" leases may, of course, produce oil, but that in doing so they must not produce or "interfere with" the natural gas associated with it without the landowner's permission.

The court judgment held that Michael Borys, a farmer who bought a quarter section of land from Canadian Pacific Railroad in what is now Leduc field, owns the natural gas under his property.

Canadian Pacific originally held large grants of land in Canada. In recent years much of the land has been sold, but Canadian Pacific has retained "petroleum" rights.

In the case ruled upon, C.P.R. had leased its petroleum rights to Imperial Oil, Ltd., which had developed production on Borys' quarter section. The court held that since C.P.R. had reserved only the petroleum rights, the natural gas is owned by Borys.

"Petroleum does not include natural gas, but is the equivalent of crude oil. Natural gas is regarded as a distinct and different product from petroleum," the court said.

How much acreage in oil areas will be affected by the ruling was not known. Oil companies looked upon the ruling as important, however, since many of them, both Canadian and United States firms, hold petroleum rights leased from C.P.R.

Crown reserve leases are not affected by the decision, since they specifically cover both oil and gas. Virtually all recent leases executed in the dominion also are believed to be so written as to be unaffected by the decision.

An early appeal from the decision was expected, with the case going to the Canadian Supreme Court, if necessary.

In giving Borys ownership of the natural gas, the court imposed a permanent injunction on both C.P.R. and Imperial preventing them from "using, removing, wasting, interfering with, or otherwise disposing of" the gas, whether dry or wet "or held in solution with the mineral."

How Imperial might produce its oil without interfering with Borys' gas, the court did not say.

MID-CONTINENT

Oil From Coal

Hydrogenation test run yields 3.7 bbl. per ton

WASHINGTON.—The latest experimental run at the coal-hydrogenation demonstration plant at Louisiana, Mo., has resulted in a yield of 3.7 bbl. of oil per ton of moisture-free coal processed, according to a report from plant officials to the Bureau of Mines.

In a 2-month round-the-clock uninterrupted run, a total of 2,600 tons of Kentucky coal was processed into oil which will be converted to high-octane gasoline in vapor-phase operations. Synthetic gasoline previously produced at the Louisiana plant is now undergoing extensive tests by the Armed Forces.

Numerous mechanical improvements and other plant refinements contributed to favorable test results of the sixth major run made by the bureau involving simultaneous operation of all primary coal-liquefaction phases of the plant, it was stated.

Among processing features considered of substantial value in conserving strategic materials for defense use was the substitution of a highly efficient and cheap iron catalyst for scarce tin catalyst previously used. The readily available iron catalyst also makes unnecessary the use of other catalysts containing such strategic materials as cobalt, nickel, chromium, or molybdenum.

Mechanical improvements tested included a change to welded hot-pipe construction in convertal stalls, reduction in converter volume, use of a new type spring-loaded and lubricated injection-pump packing, and new valve material more resistant to corrosion.

Harmon Sells Holdings

Sinclair Oil & Gas Co. has acquired 82 producing leases in Childers field, Oklahoma, for a consideration of approximately $4,000,000.

The purchase was made to acquire contiguous floodable acreage to Sinclair's holdings in the field. In this field recent water-flooding operations have increased production from 5,000 bbl. per acre to 11,000 bbl. It is considered one of the most profitable areas for this type of secondary recovery.

The leases were purchased from C. C. Harmon, Harmon & Whitehill, C. C. Harmon & J. Wood Glass, and C. C. Harmon et al.

Total current production involved is about 850 bbl. daily. Eighty of the leases are in Nowata County and one each in Rogers and Creek counties.

In another deal, involving about $500,000, C. C. Harmon sold his interest in 26 leases in Okmulgee and Rogers counties to Whitehill Oil Corp., joint owner with Harmon.

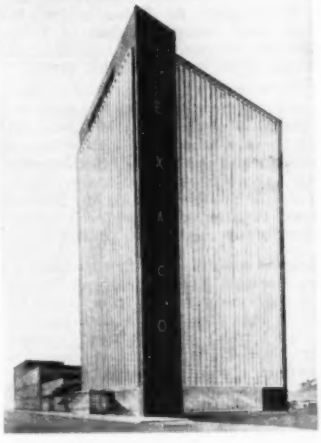
This deal involved production of about 350 bbl. daily. Fifteen of the leases are in Okmulgee County and 11 in Rogers. Part of the Rogers County leases are being water flooded.

A spokesman for Harmon said he received slightly in excess of $4,700,000 in the two deals.

More Staff Jobs Open

Capital invested in tools to give each man a job in the oil business is about $20,000. Because of the use of power and machinery there is less manual labor to do and industry can offer more supervisory, staff, and research jobs than formerly, it was declared by L. F. McCollum, president of Continental Oil Co., Houston, in a commencement address at the University of Tulsa, May 28.

Men entering industry today have more opportunity and less uncertainty than ever before if they accept the challenge to create more goods and things to raise the standard of living, McCollum said, but the most important thing for industrial management to learn is human relations and the art of dealing with the public.



To Go Up Soon

Construction is scheduled to begin immediately on this ultramodern 16-story office building of The Texas Co. at the corner of Canal and Marais streets in New Orleans. Texaco this week said a National Production Authority permit has been granted. Steel and other critical materials have been on hand several months. The building will house the company's producing and sales departments. Site was leased on a long-term basis from Grace Episcopal Church, which stands at that location. The company said the building will have an all-welded frame with no interior columns.

MEETINGS

Penn-Grade Convention

PITTSBURGH.—Increasing oil recovery by employing carbonated water as a medium to drive oil to producing wells will be the topic of an address before the twenty-eighth annual meeting of Pennsylvania Grade Crude Oil Association at Hotel William Penn here June 14.

Speaking on this new development will be James W. Martin, consulting engineer with Oil Recovery Corp., New York City.

Also to appear on the program are Dr. H. A. Leedy, director, Armour Research Foundation, Chicago; Dr. Milton S. Eisenhower, president, Pennsylvania State College; D. C. O'Hara, Washington, associate counsel for P.G.C.O.A., who will discuss the Pennsylvania oil industry and the mobilization program; W. H. Gove, sales-development manager, Minnesota Mining & Manufacturing Co., St. Paul; and C. L. Harding, New York City, coordinator of Middle East oil operations for Socony-Vacuum Oil Co., Inc., of which he is a director.

Radio Meetings Scheduled

WASHINGTON.—The central committee on radio facilities of the American Petroleum Institute has been called by Chairman F. W. Littell of the Shell Pipe Line Corp., Houston, to meet at the A.P.I. office here June 6. The annual meeting of the National Petroleum Radio Frequency Coordinating Association has been set for the following day by Chairman H. A. Rhodes of Transcontinental Gas Pipe Line Corp., Houston, also at the A.P.I. office.

The meetings were scheduled for these dates so that they may follow the radio-location-service hearings of the Federal Communications Commission June 4 and 5. Both meetings will be open to the industry.

ROCKY MOUNTAIN

Gas Discovered in Uinta

RANGELY, Colo.—Gas possibilities of the northeastern flank of Uinta basin were heightened this week as Roy M. Johnson, Ardmore, Okla., and Vernal, Utah, operator, cemented long string to complete his gas discovery at West Douglas Creek. It lies 18 miles southwest of this town in Rio Blanco County.

Johnson set 8-in. pipe at 2,218 ft. at his 1 fee, C SE¼ 12-2s-104w, and will run liner to complete the well. Earlier, the well flowed an estimated 3,500 M.c.f. of gas daily at 2,495 ft., total depth. Pay is in a sand of the basal Mesaverde series of Upper Cretaceous age.

MIDDLE EAST

Showdown Looms

Iranian Government gives Anglo-Iranian until midweek to assist in oil nationalization; company refusal expected

Dahl M. Duff

THE Iranian Government has given Anglo-Iranian Oil Co., Ltd., until the middle of this week to assist in the nationalization of company properties.

The Iranian finance minister sent a letter to N. R. Seddon, the company's representative in Teheran, asserting that the government would take unspecified action of its own unless the company appointed representatives before May 31 to arrange for execution of the nationalization law.

In response to the government demand, the company announced in London that it was instructing Seddon to attend the conferences on nationalization but solely in the role of an observer. The company said its representative would be present as a gesture of respect to the government but that he would do no more than listen and report on action taken.

The deadline set by the government for compliance with its request indicated the crisis may come this week. The government presumably will then move to take physical possession of the fields and refinery installations in Khuzistan Province.

Over last week end, both Anglo-Iranian and the British Government in separate requests asked that the International Court of Justice at The Hague assist in the dispute. Anglo-Iranian petitioned the court to appoint a single arbiter as provided in the 1933 agreement. The Iranian Government 2 weeks ago turned down arbitration with the statement that nationalization was its "sovereign right."

The British Government at the same time asked the court to rule that the Iranian Government is required under international law to arbitrate the issue. Otherwise Iran would be found guilty of violating international law and be subject to full satisfaction and indemnity. Both Iran and Britain are signers of the international agreement accepting the court's compulsory jurisdiction in any treaty dispute.

American beliefs.—In United States oil circles, the belief persisted that Britain will not passively allow the properties to be taken over summarily by the Iranians. However, Britain has promised the United States it will not send troops into the country without first consulting Washington, unless there is a breakdown of public order or a revolution.

The exact plans of the 12-man Iranian Government liquidation commission are not known. A government representative on the commission said the oil nationalization would be carried out regardless and that "anything we cannot manage we will close down." The commission was reported to have made plans to call in eight foreign experts.

Meanwhile, there were scattered but increasing signs pointing to some sort of settlement short of actual seizure of the company's properties. The problem seemed to be one of finding a face-saving solution, possibly within the framework of a modified nationalization plan that would continue British operation.

Newspapers in Teheran for the first time voiced criticism of Prime Minister Mossadegh, the melodramatic leader of the nationalization group.

Diplomatic circles in London were becoming more optimistic over the possibility of an amicable settlement. Last week the first opposition to Mossadegh's government developed in the Iranian Parliament, and some influential political groups in Teheran were reported anxious for a settlement of the oil issue.

Support sought.—The British Government sought diplomatically to line up international support from countries likely to suffer from a deterioration of the Iranian oil properties. Pakistan told Iran it hopes for an amicable solution. India also was asked by Britain to use its "good offices," but refused. India receives about 80 per cent of its oil requirements from Iran, and was threatened with immediate shortages during last month's shutdown at Abadan. France, Turkey, and Iraq also were approached by Britain to assist in settling the dispute.

In Teheran, government officials went to some lengths to ban the name of Anglo-Iranian from all official documents and communications.

Iran closing in.—On several sides the government appeared to be closing in on the company. It was reported late last week to have issued a decree requiring Anglo-Iranian to deposit all foreign-exchange earnings from the sale of oil into the Iranian National Bank for conversion at the artificially low rate normally given the company.

A member of the liquidation commission said plans of the group entail prompt application of two measures—a customs tax on all Anglo-Iranian imports and another levy on exports. He said the execution of these measures would be entrusted to a group of administrators to be sent to Abadan. This and other statements indicated the apparent confusion on the part of the government on how to proceed with nationalization and also gave indication of the grave financial position of the government.

No Russian help.—There were reports earlier that Russia had made an offer to assist Iran by providing technicians and promising to buy oil. This was officially denied by the premier's office in Teheran. Speculation continued over Russia's likely reaction if Britain moves in troops to protect the company and the personnel. Diplomats in Moscow were convinced Russia would enter Iran quickly if Britain uses force.

The United States along with Britain was made a target for renewed outbursts and demonstrations in Teheran. Resentment against the United States was touched off by the State Department statement that unilateral cancellation of the concession agreement by Iran would be serious and would weaken the validity of contractual arrangements all over the world. In an official note Iran called it meddling in its own internal affairs. The British all along have been somewhat disappointed because Washington has not taken a stronger stand.

Iraq negotiations.—Negotiations continued in Bagdad between representatives of Iraq Petroleum Co., Ltd., and the Iraq Government. Basis for these talks between the company's delegation, led by H. S. Gibson, managing director, and the government, is I.P.C.'s offer to 50-50 participation such as was granted in December to Saudi Arabia.

Extremist elements in Iraq demanded that the government follow Iran's course and nationalize the industry. The government was taking a saner view. In the negotiations it was understood both sides were playing for time, with the Iraquis waiting to see how successful the Iranians are in defying Britain and obviously not ready to accept any settlement which might turn out to be less desirable than that obtained elsewhere.

One issue in Iraq is the company's shut-in fields in Mosul, which are uneconomical to produce. Under terms of this separate concession, Iraq would receive 20 per cent of production over and above royalty. The government claims that failure to produce these fields deprive it of this oil.

Aramco Wildcat

Ithmaniya discovery may prove new Arabian field

AN eighth producing area in Saudi Arabia is indicated by the Ithmaniya discovery announced recently by Arabian American Oil Co. *(The Oil and Gas Journal, May 17, page 85.)*

The well, located about 40 miles south of Ain Dar field and 20 miles west of the city of Hofuf, was completed in the D member of the Arab zone, which is the most productive horizon in other Saudi Arabian fields.

Second well staked.—On a drill-stem test at about 6,900 ft., the well produced 30.5°-gravity oil at an undisclosed rate of flow. Location has been made for 2 Ithmaniya, and the company was moving in temporary storage facilities to allow more complete testing of the discovery. The oil is sour in quality.

The successful wildcat is the first for the company since 1949, when production was found at Fadhili and Haradh. Both areas are shut in, as is Abu Hadriya. Aramco's present production of approximately 700,000 bbl. daily is obtained from Abqaiq, Dammam, Ain Dar, and Qatif.

***NEW DISCOVERY.**—This map shows Arabian American Oil Co.'s new Ithmaniya discovery in relation to other Aramco producing areas.*

Ain Dar, which was brought into commercial production only a few months ago, supplements withdrawals from Abqaiq, the major producing area. Ain Dar was discovered in 1948, and its southern end is not yet completely defined. The 30.5°-gravity crude obtained from the new discovery is somewhat lower than the approximately 34°-gravity oil from Ain Dar and the 36°-plus-gravity crude from Abqaiq.

LATIN AMERICA

De Mares Agreement

Concession reverts to Colombia August 25; International will provide technicians, rent refinery from Colombia

THE way in which the Standard Oil Co. (N. J.) organization and the Colombian Government will work together in operating the De Mares concession after August 25 is gradually becoming clearer as a result of arrangements being made in Bogota.

On August 25 the De Mares properties pass to government ownership on expiration of the 30-year concession. The four fields and the 25,000-bbl. refinery are Colombia's principal source of oil, and their reversion to the government is the first important instance of a government acquiring an oil concession through normal expiration of its terms.

Cost-plus basis.—International Petroleum Co., Ltd. (Colombia), and the Colombian Government recently signed the formal detailed agreement under which the company will provide technical assistance in the production and exploration. This contract made one somewhat significant change from the memorandum of agreement negotiated late last year.

Instead of a percentage of the oil production, International will provide technicians on a cost-plus basis. The memorandum outlining the framework for the contract *(The Oil and Gas Journal, January 4, page 35)* provided that the company would be paid in pesos or crude amounting initially to 4 per cent of the production.

Involved in this technical-assistance agreement are from 18 to 22 technicians in the engineering, exploration, accounting, industrial-relations, materials and commissariat, transport, and mechanical departments. Their salaries and other expenses are expected to be about $25,000 a month, and in addition, International will receive 20 per cent more to cover indirect costs.

Refining plans.—Another move preparing for the transition to government ownership was the recent approval of the incorporation of Empresa Nacional de Petroleos as the government operating agency. The capital of $40,000,000 included $200,000 subscribed by the government with the balance consisting of the value of the De Mares concession. The incorporation papers provided that in refining preference be given to products of domestic consumption.

Despite the fact that there is less than 3 months before the concession properties revert, no detailed contract has yet been signed to implement the companion memorandum on refining which also was announced last December. The plan is that International will take a 10-year lease on the refinery, lend up to $10,000,000 for its modernization, including a cracking unit, preferentially buy the De Mares crude from the Empresa, and pay Empresa as the plant owner a fee based on throughout. Of the refining profits, 75 per cent would go to the Empresa.

The government about 2 years ago had Foster Wheeler Corp. make a detailed economic and technical study of the country's oil position and at the time made some arrangements regarding the refinery with Foster Wheeler. The Colombian authorities have long sought a modern processing unit expanded as far as possible to lessen the country's oil products imports.

Marketing.—The De Mares concession with its refinery, gasoline plant, and present production of nearly 40,000 bbl. daily of crude and condensate, have been operated by Tropical Oil Co., an International subsidiary.

Tropical also is practically the sole marketer of products in Colombia. This integration, along with the fact that oil prices are controlled at the retail level in Colombia, complicates the arrangements in regard to De Mares.

As now set up, the Empresa does not extend to marketing, but there remains the possibility of other companies, and particularly those with production in Colombia, entering this field.

Maracaibo Dredging

Three major companies offer monetary support

THE Venezuelan Government's project to dredge the Lake Maracaibo bar appears to be somewhat more advanced as a result of preliminary agreements offering about $23,000,000 in oil-company support.

This sum was subscribed by the three largest of the five companies operating in Western Venezuela. Creole Petroleum Corp. and Shell each offered about $9,000,000, and Mene Grande Oil Co. more than $3,000,000. The government is understood to be looking also for support from Richmond Exploration Co. (Standard Oil Co. of California) and Texas Petroleum Co. (The Texas Co.) both of which have smaller production in the lake area.

Government bonds.—The tentative plan provides for the companies to buy special bonds issued by the Venezuelan Government in the amount called for in their offers. Whether

the government later would finance the bonds by tolls on vessels using the channel is in question. Most of the tonnage moving in and out of the lake consists of oil tankers.

The project calls for dredging a channel to permit ocean-going vessels to enter the lake. The channel would permit silt to be swept out to sea.

Various cost estimates were made when the proposal was actively considered about 3 years ago. A substantial part of the cost would go into the jetties, but there is some question as to whether these would be necessary. Even without them, the cost probably would be well over $50,000,000. Besides the financing, the government also faces the problem of obtaining materials. Most of these would have to be obtained from the United States which is now carefully examining all such proposals involving export of materials needed for defense.

Western Oil Eyed

Petrofina looks to Latin American and other Western Hemisphere operations to replace oil lost in Romania

THE active interest which Petrofina (Cie. Financiere Belge des Petroles) has taken in the last 2 years in exploration and producing operations in the Western Hemisphere is aimed at reestablishing an integration which the company enjoyed before the war.

Petrofina holds a major or controlling interest in refining, marketing, and tanker companies operating in several European countries, the Belgian Congo, and southwestern Africa. Since 1948, it has become more familiar to American oil men as a partner of American Independent Oil Co. in Mexico and as a participant in the development in western Canada.

Seeking production. — In New York last week, Laurent B. Wolters, a managing director of the company, explained that Petrofina's work in the Western Hemisphere stems out of the fact that the prewar production the company had in Romania has been lost, and that it desires to rebuild an interest in this phase of the industry.

This holds true even though its production in the Western Hemisphere might not go directly to the company's European refineries. What crude Petrofina develops on this side of the Atlantic could be sold, and other oil bought in the Middle East for the company's plants in Europe.

Refining interest. — Petrofina's principal refining interest is its half share of a new 35,000-bbl.-daily plant due to be completed the latter part of this year in Antwerp. Anglo-Iranian Oil Co., Ltd., has the remaining 50 per cent. Petrofina's prewar French refinery at Dunkirk was destroyed and the company now has a processing arrangement with Anglo-Iranian's French subsidiary. Wolters said there is no reciprocal arrangement between France and Belgium on war damages.

Exploration activity. — The Petrofina official could not say if the company might later attempt to undertake exploration activities in the United States. Prices, he added, are very high in this country. He said he was aware of questions raised regarding the Mexican C.I.M.A. venture, but pointed out that many millions have been spent in unsuccessful exploration throughout the world and that the oil discovered determines the outcome of an exploratory operation in the final analysis. He said there is undoubtedly much oil to be found in Mexico.

Petrofina now holds 43⅓ per cent interest in Mexican American Independent Co. (C.I.M.A.) which negotiated the first important percentage-of-production contract with Petroleos Mexicanos 2 years ago. The venture originally was divided equally between American Independent Oil Co., E. W. Pauley, and Signal Oil & Gas Co.

Mexican venture.—Before the drilling was commenced on the designated structures in southern Mexico 1½ years ago, Petrofina bought 20 per cent of Pauley's interest. Signal's entire interest was purchased by American Independent, and on April 18, 23⅓ per cent sold to Petrofina. Petrofina and American Independent now have 43⅓ per cent each with the remaining 13⅓ held by Pauley. All these transactions were made with the approval of the Mexican authorities.

C.I.M.A. is now testing two new structures, Tecominuacan, southeast of Tortuguero, where location is being prepared, and Rabon Grande, a tidelands site east of Tortuguero where a well is now drilling below 1,000 ft. The original C.I.M.A. agreements designated three tidelands and four upland structures.

Gas reserves.—The two gas producers drilled by C. I. M. A. at Xicalango showed large gas reserves, Wolters said. These wells are sufficient to supply the short line being built by Pemex to Carmen. One of the two oil wells drilled at Tortuguero is producing. There are no present plans to produce the one gas well drilled on this tidelands structure.

Friendly negotiations are now under way with Pemex in regard to the price for the Xicalango gas for which C.I.M.A. will be paid. The original contract set up a formula for oil based on a comparable United States crude, but negotiations for gas were not consummated. Pauley's Reynosa contract provided 55 per cent of the take until expenses are recovered, plus 15 per cent on gas production, and a clause in the C.I.M.A. contract gives it the benefit of more favorable terms subsequently negotiated.

African exploration.—Petrofina is negotiating with the Portuguese Government for exploration rights in Portuguese West Africa. The areas of interest are Cabinda and a part of Angola which lie on either side of a strip of the Belgian Congo reaching to the South Atlantic coast. Petrofina has done geological work in the area. Petrofina's president, Vicomte Alois Vande Vyvere, said at the company's recent general meeting in Brussels that the Portuguese negotiations were likely to reach a satisfactory conclusion in the near future.

Gulf Sale

Pemex completes purchase of Gulf's Mexican holdings

PETROLEOS MEXICANOS has purchased the Mexican holdings of Gulf Oil Corp. for $2,350,000.

Gulf is the only major United States company whose properties were not taken over by the Mexican Government in the 1938 expropriation. It operated in Mexico under three subsidiaries, Mexican Gulf Oil Co., S.A., American International Fuel & Petroleum Co., S.A., and Hamilton & Devine, S. en C.

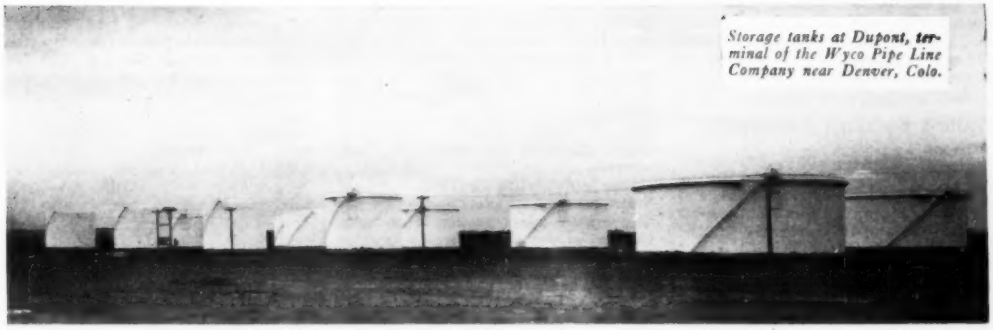
Sen. Antonio J. Bermudez, Pemex director general, made the first payment on the property by turning over a check for $1,000,000 to Carlos Lamar, Gulf representative, in Mexico City.

The check is the first of a series of 20 monthly notes which will range in amount up to $73,000. Last of the payments will be made in December 1952.

Gulf was indirectly forced to sell its properties as a result of Mexico's withholding export permits for its crude oil. Only two foreign firms still hold land in Mexico: Kermex Oil Fields Co. (British) and Charro Oil Co. (United States).

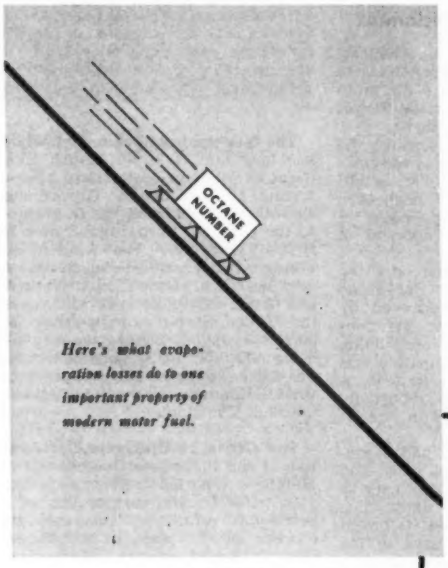
Many of the Gulf staff will be retained by Pemex, an announcement said. The entire local force of more than 400 employes received 4 months' salary, plus 25 days for every year of service with the company as severance pay.

With the purchase Pemex acquired: (1) A group of concessions covering areas of proven productivity in Cacalilao, Panuco, and Altamira; (2) crude-oil stocks of about 1,000,000 bbl. at Tampico; (3) wells with a daily production of about 1,500 bbl.;



Storage tanks at Dupont, terminal of the Wyco Pipe Line Company near Denver, Colo.

A good example of proper tank selection



Here's what evaporation losses do to one important property of modern motor fuel.

Above: This sketch is based on the fact that a volumetric loss of 1.0 per cent during storage causes a drop of one point in octane rating. It also causes a decrease of 0.8 lbs. per sq. in. in vapor pressure and a rise of 5 degrees F. in the 10 per cent point.

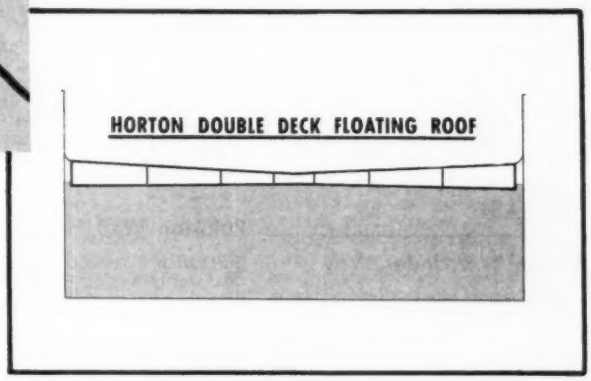
Right: Sketch showing how Horton Double-Deck Floating Roof floats directly on the liquid in the tank.

The Wyco Pipe Line Company ships the following refined products through its line between Casper, Wyo., and Denver, Colo.: gasoline, burner oil, tractor fuel, kerosene and diesel fuel.

Wyco realized that the differences in volatility could present storage problems. If gasoline, for example, is stored in fixed-roof tanks, its quality drops. (See sketch at left.) This happens because rich vapors escape through the vents during filling or when temperatures rise.

So Wyco wisely selected each tank to suit the volatility of the product it stores. Gasoline is stored in tanks equipped with the HORTON DOUBLE-DECK FLOATING ROOF. This efficient roof stops venting because it eliminates any vapor space by floating directly on the liquid.

Like Wyco, you can cut storage costs by selecting tanks to suit products. Write—without obligation—to our nearest office for advice or assistance.



CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 17...1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3...1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 4.....1554—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N.V., Amsterdam—O, Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Rio de Janeiro, Brazil

(4) all installations such as pipe lines, pumping stations, shipping terminals, tanks, and other storage facilities; (5) about 103,000 acres of land in Veracruz and Tamaulipas.

Phillips Building Two Plants

Phillips Oil Co. now has under construction a gas-repressuring plant and a crude-stabilization and gas-treating plant in San Roque field, on its Venezuelan concession in the State of Anzoategui.

Both plants are adjacent to the refinery and wax plant which Phillips has under construction in the field and which is scheduled to begin operation in June of 1952.

The repressuring plant is designed to inject 26,000,000 cu. ft. of gas daily at 3,500 psi. into the San Roque producing formation. It is expected to begin initial operation in August.

The crude-stabilization and gas-treating plant is designed to stabilize 10,000 bbl. of crude oil daily and recover approximately 1,000 bbl. of natural gasoline. It is expected to begin operation in December.

Erection of both plants is under contract to Chicago Bridge & Iron Co., Ltd., Caracas. Basic design work was done by Phillips.

Oil Convention Planned

Venezuela's first national petroleum convention will be held September 9-18 in Caracas.

Oil men, representatives of technical societies, and government officials from throughout the world will be invited to attend the event.

Purpose of the convention is to familiarize the rest of the world with the Venezuelan oil industry and its problems. All papers presented will deal with Venezuelan oil activities.

In addition to the meetings in Caracas, plane tours will take visitors to producing fields and oil installations in western Venezuela.

FAR EAST

Borneo Test Under Way

Royal Dutch-Shell is attempting to broaden its already major production in North Borneo with two wildcat operations in the interior of Sarawak.

Geological and geophysical work located structures at Bulak Setap and Sebis in the densely forested jungle of the British colony. At Bulak Setap, a 30-mile road has been constructed during the last 18 months from Miri at a cost equivalent to more than $500,000, and the well is expected to be spudded in shortly.

The Sebis well is now drilling below 1,000 ft. This location is accessible to shallow-draft craft which bring equipment and personnel up the narrow Niah River from the coast on the South China Sea. Shell is using heavy drilling equipment with a capacity to reach 10,000 ft. or more.

The operations in Sarawak are by Sarawak Oilfields, Ltd., a Royal Dutch - Shell subsidiary. Adjoining Sarawak on the north is the State of Brunei where another subsidiary, British Malayan Petroleum Co., Ltd., operates the important Seria field.

Due entirely to the expansion of Seria, production from British Borneo has shown a spectacular rise since the end of the war. Output a year or more back surpassed Trinidad to become the No. 1 producing area of the British Empire, and it is now above 100,000 bbl. daily. Limited amounts of the crude are imported on the West Coast by Standard Oil Co. of California.

Shell to Return to Indonesia

Reports from Indonesia indicate preparations are now being made to return the North Sumatra oil properties to N.V. de Bataafsche Petroleum Mij. (Royal Dutch-Shell).

Because of political dissension, the area has been inaccessible to the company since the end of the war. Small-scale makeshift operations have been carried on under the supervision of the former Republic Government of Indonesia.

The facilities are understood to be largely in ruins. The Pangkalan Brandan refinery was destroyed by the Dutch in advance of the conquering Japanese and reconstruction carried out during the occupation was wrecked by allied planes in 1945. A large part of the plant reportedly was burned by extremists in August 1947.

In 1939 North Sumatra had a production of about 22,000 bbl. daily, and the Pangkalan Brandan refinery a capacity of 18,000 bbl. daily. The Royal Dutch company had its origin in oil operations in the area in the 1880's. The Pangkalan Brandan refinery was built in 1892.

Pakistan Well Finds Shows

Pakistan Petroleum's No. 4 well at Chakwal in Junjab Province of West Pakistan has obtained encouraging shows, and the company at last report was preparing to make more complete tests of the well's productive capacity.

The possible production was encountered in the No. 4 well at a depth of 8,212 ft. Drilling began January 27, 1950, and was delayed at 6,495 ft. by a high-pressure water sand. In March of this year, the well was deepened to 8,061 ft. to the Sakesar limestone but indications of oil in that formation were disappointing.

The present depth at which the shows were encountered is the same as that of the company's No. 2 well which was brought in in June 1949. The Nos. 1 and 3 wells in the area both were dry.

Pakistan Petroleum, Ltd., is an affiliate of Burmah Oil Co., Ltd. The Chakwal field consists of two divisions, Joya Mair and Balkassar. It was discovered in 1944 by Attock Oil Co., Ltd., which has several producers in the area. The Burmah Oil affiliate is now making plans for drilling other development wells on its lease in the field.

International Briefs

California Texas Oil Co., Ltd., has reached a temporary agreement with the Australian company, Ampol, to participate in exploration of the Exmouth-Gulf region of Western Australia. Ampol holds rights in the area and has been doing some preliminary work during the last 2 years. Some amendments to Western Australian legislation controlling oil exploration are necessary before the agreement between Caltex and Ampol can operate.

The Guatemalan Government, which has long laid claim to British Honduras as Guatemalan territory, is protesting to the British Government against oil-exploration rights granted to the Gulf Oil Corp. organization in British Honduras. The Guatemalan Foreign Office said the new protest may be taken to the United Nations, and that Gulf will be notified through the United States embassy that the permit is illegal. Britain recently renewed its offer to Guatemala to take the legal aspects of the dispute over British Honduras to the International Court at The Hague.

The Office of Economic Coordination of the Philippine Government in Manila is reported to have approved a proposal for the construction of a petroleum refinery. Plans call for erection of the plant in the Manila area. It would operate on imported crude since there is no production in the islands, despite efforts of the government to encourage exploration.

Cuban Gulf Oil Co. has commenced drilling its second offshore test in the Bay of Cadiz, about 50 miles east of the first well in the Bay of Cardenas on the north coast of Cuba. Operations are from a platform. The first test went to 5,045 ft. and found some noncommercial heavy oil before it was abandoned.

The United States according to Washington reports may soon propose a petroleum-planning board composed of the 12 Atlantic Pact countries to mobilize the free world's oil reserves in event of war. It is reported that such a board would make certain that armed forces of the free countries would have quick access to enough oil to fight a war in any area of the globe.

PERSONALS

W.P.C. Chairman

Schuitemaker heads council which organizes congresses

CHAIRMAN of the permanent council of the World Petroleum Congress, now in session in The Hague is C. G. Tuyl Schuitemaker, of the Netherlands.

He is chairman of the Petroleum Engineering Section of the Royal Netherlands Institution of Engineers and adviser to the Royal Dutch-Shell Corp.

He was elected chairman succeeding Col. Louis Pineau of France, who died in September 1950.

Schuitemaker was born in 1889. After studying at the Delft Technical University he received a mechanical-engineering degree in 1913. He remained at the Technical University for another year as a postgraduate assistant in physics. During the First World War he served as a reserve officer in the Netherlands Army.

In 1918 he joined Bataafsche Petroleum Mij. (Royal Dutch-Shell Group) in Indonesia as an engineer. He began his career as a field engineer and was later put in charge of the engineering department in Sumatra.

From 1923 to 1926 Schuitemaker worked in the United States, where he spent some time in the purchasing department of Asiatic Petroleum Co., a Shell affiliate, in New York. He also spent some time in the United States studying gas problems.

In 1926 he returned to the Netherlands, where until 1950 he worked in the engineering department at The Hague head office of the Dutch-Shell Group.

N. H. Warriner has been promoted to assistant chief engineer at Socony-Vacuum Oil Co.'s Trenton, Mich., refinery. Others promoted include: **L. M. Griffore,** to design engineer; **R. S. Baxter,** to corrosion engineer; and **R. M. Woolcott,** to salvage engineer.

A. K. Cline, independent oil operator and producer in the Pennsylvania Grade area, has joined Seminole Oil & Gas Corp. as operations manager. The firm has moved its offices from Dallas to Midland, Tex.

Glenn E. Nielson and **A. A. Stambaugh** have been elected to the board of directors of the American Petroleum Institute. Nielson, of Husky Refining Co., Cody, Wyo., will be second director in the refining group representing the Rocky Mountain area, and Stambaugh, Standard Oil Co. (Ohio), will serve as the twentieth director in the at-large group.

Dr. Claude E. ZoBell, professor of marine microbiology at Scripps Institution of Oceanography, La Jolla, Calif., will participate in the Galathea Deep Sea Expedition. ZoBell will leave The Hague, where he will present a paper on the part played by bacteria in the geogenesis of petroleum at the Third World Petroleum Congress, to join the expedition in Manila. He will spend several weeks collecting and examining sediments from the deepest parts of the ocean between Japan and Australasia.

R. E. WILSON

Dr. Robert E. Wilson, chairman of the board of Standard Oil Co. (Ind.), has been invited by the Council of the Institute of Petroleum to deliver the third Cadman Memorial Lecture on June 21 at the Royal Institution in London. The Cadman Memorial Medal will be presented to Wilson by **C. A. P. Southwell, M.C.,** president of the institute. The title of his address will be: "Management and Research in the Petroleum Industry."

John M. Cosey, formerly with the Texas Railroad Commission at Kilgore, Tex., has joined Superior Oil Co. at Houston as petroleum engineer.

Herbert E. Randlett, Jr., administrative assistant to the director of research at Shell Development Co.'s Emeryville, Calif., laboratories, has been named technical representative in the New York office. He replaces **Harry K. Sutherland,** who has left for California, where he will be assistant director of Shell Oil Co.'s agricultural laboratory at Modesto.

Jean L. Lee has been transferred from Oklahoma to Bismarck, N. D., as geologist in charge of the new Bishop Oil Co. district office established there.

Sam M. Gladney has been appointed manager of Sun Oil Co.'s Southwest producing division, succeeding

S. M. GLADNEY

TOM F. HILL

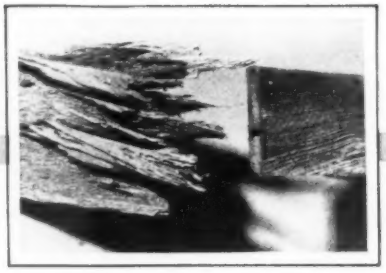
J. H. Pressley, who has relinquished all managerial and official capacities with Sun because of illness. Pressley has been with Sun since 1905. Succeeding Gladney as assistant manager will be **Tom F. Hill,** who has been regional land superintendent. Gladney joined Sun in 1919 and was named assistant manager of the Southwest division in 1947. Last month he was elected an assistant secretary of Sun. Hill joined the firm 20 years ago and became an assistant to Gladney last year.

Arne H. Pokky, 1950 Kansas University graduate, has joined Tide Water Associated Oil Co. as assistant geologist at Corpus Christi, Tex.

Allen Ehlers, district geologist for Skelly Oil Co., has been elected president of the Midland Geological Society, succeeding **Max David,** independent oil operator and consulting geologist. **W. H. Thams,** division manager for Anderson-Prichard Oil Corp., was elected vice president, succeeding **W. S. Blackman,** geologist for Lion Oil Co. **H. L. Swords,** division geophysicist for Union Oil Co. of California, is the new program chairman, and **Waring Bradley,** geologist for Permian Basin Sample Laboratory, was elected secretary-treasurer. The new officers will be installed at the first fall meeting.

Vernon L. Atkinson has been named superintendent of Esso Standard Oil Co.'s mechanical and power department at the Bayonne, N. J., refinery. He succeeded **Arthur W. Akins** who retired. Other changes include: **William E. Whaley,** who succeeds Atkinson as assistant mechanical superintendent; **Edward J. Tierney,** who succeeds Whaley as chief engineer; **William T. Greed,** who succeeds Tierney as head of the mechanical trades division; **John L. Birkler,** who succeeds

A New Method* to STOP and PREVENT Fungi Deterioration in Cooling Towers



* *For further details, write for the special report, "Fungi Deterioration of Cooling Tower Lumber."*

IS THIS HAPPENING INSIDE YOUR TOWER?
At left is a typical piece of fungi-destroyed cooling tower lumber, as compared to an infection-free slat with comparable length of service. Insidious in early stages, this cancerous attack is hard to detect — has been, until now, harder to combat.

CONTAGIOUS fungi deterioration in cooling tower lumber can be far advanced before its presence is even suspected. Complete collapse of drift eliminators is sometimes the first indication.

One significant fact led Nalco scientists to the right answer to fungi control: In infected areas, *not a single cooling tower using the Nalco No. 33 Method and Nalco No. 21-S Slimicide Treatment was attacked.*

Further investigation and research indicates that the same treatment, with variations in dosage procedures, effectively *stops* fungi deterioration.

A brief outline of the Nalco Method is given at right. Complete data on dosages and results are yours for the asking.

HOW THE *Nalco* METHOD WORKS

- Nalco No. 33 Treatment keeps cooling systems scale- and corrosion-free; prevents delignification of cooling tower lumber because *it holds pH values to 6.0 — 6.5*, close to the natural environmental pH of the wood.
- Nalco No. 21-S is a powerful slimicide — a synergistic compound of chlorophenolic derivitives; with stabilizing, dispersing and penetrating agents added.
- Combined action of Nalco 33 and 21-S, with the resultant low pH, creates a medium in which fungi cannot survive.
- Basic treatment procedure to stop or prevent fungi deterioration is to adjust pH values properly with Nalco No. 33, then shot-feed Nalco No. 21-S at intervals sufficient to keep slime, algae and fungi growths under control.

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PERSONALS

Greed as general foreman of the pipefitting department. **Martin S. O'Flaherty** was named assistant general foreman under Birkler. Atkinson started with Standard Oil Development Co. as an engineer 22 years ago and has been at Bayonne since 1937.

George Jenkins, of LaGloria Corp., has been elected president of the Shreveport Geological Society, succeeding **Fred R. Schroder,** of Union Producing Co. Other new officers elected were **Charles Hickcox,** of Centenary College's geological department, vice president, and **Michael W. Beckman,** of Skelly Oil Corp., secretary-treasurer.

G. W. Berger, formerly with Shallow Water Refining Co. at Scott City, Kans., has joined Berry Asphalt Co. at Waterloo, Ark., as superintendent.

Julius O. Sensat, petroleum engineer for Sun Oil Co., has been transferred from Seabreeze, Tex., to Chacahoula, La.

Harrison H. Heisler has been appointed vice president in charge of operations for Albercan Oil Corp., a

H. H. HEISLER

ROY P. STAMM

Canadian subsidiary of Pancoastal Oil Co., C. A. **Roy P. Stamm** was appointed exploration manager of the firm. Heisler attended University of Alberta in Edmonton and after graduation joined Alberta Natural Gas and Petroleum Services Board. Following his discharge from the service in 1945, he went to South America for Socony-Vacuum Oil Co. and worked for 2 years in Venezuela and 2½ years in Colombia as a specialist in production and equipment problems. He returned to Canada in 1950 and joined Albercan in September of that year. Stamm graduated from Pennsylvania State University and following his discharge from the Army joined Mene Grande Oil Co. at San Tome, Venezuela. Later he was associated with Pantepec Oil Co., C. A., as development engineer and geologist in the Jusepin area. He transferred to the Albercan staff at Calgary in January 1950 as senior geologist. He was named chief geologist of the firm in October 1950.

TULSA GEOLOGISTS.—Newly elected officers of the Tulsa Geological Society are shown above, left to right, front row: E. V. McCollum, E. V. McCollum & Co., Tulsa, councilor; Mrs. H. V. P. Branson, Shell Oil Co., secretary-treasurer; H. T. Morley, Stanolind Oil & Gas Co., councilor; and E. P. Neal, Tide Water Associated Oil Co., second vice president. Back row: Robert Lantz, Woods Drilling Co., business manager, digest; V. L. Frost, Ohio Oil Co., president; John C. Maher, United States Geological Survey, retiring president; and E. Floyd Miller, consultant, councilor. Garvin L. Taylor, Stanolind, first vice president, and Harold Enlows, University of Tulsa, councilor, were not present.

L. E. Todd, plant superintendent for Lone Star Gas Co., has been transferred from Grapeland, Tex., to the Katie gasoline plant at Wynnewood, Okla.

Walter J. Levy, petroleum-industry economic consultant in New York, has been appointed oil consultant to the Materials Policy Commission which was set up by the President to study the requirements and supply outlook for essential commodities.

Harry J. Sheard, refinery manager for Bayou State Oil Corp. and director of technical sales at Shreveport, La., will be awarded Louisiana State University's first professional degree of chemical engineer at the June 2 commencement. Requirements for the degree are a B average for undergraduate work, at least 5 years of outstanding achievement in the profession, and a graduate thesis approved by the factulty. The use of oyster shell for building materials was chosen by Sheard for his thesis subject. Prior to joining Bayou State he was chief chemist and chemical engineer for Crown Central Petroleum Co.

C. E. Loomis, assistant vice president of Columbia Gas System, Inc., and the system's service company, Columbia Engineering Corp., has been elected vice president of both firms. **E. D. Bivens,** treasurer of both the parent and service subsidiary, resigned these posts to accept the election as vice president and director of the Charleston, W. Va., group companies of the system. The Charleston group boards advanced **Oliver S. Hagerman** from the presidency to chairman and elected **John W. Partridge,** president. **Francis H. Crissman,** formerly assistant treasurer of both Columbia Gas and Columbia Engineering, was elected treasurer of the parent company, while remaining as assistant treasurer of Columbia Engineering.

H. Janney Nichols, Jr., a director and former general manager of the supply and transportation department of Esso Standard Oil Co., has been named general manager of the reorganized supply department which consists of four new divisions. **Glenn W. Poorman,** formerly manager of general office sales, will be assistant general manager, and also will serve as chairman of a supply committee composed of members of the company organization.

R. W. Burns, foreman of the catalytic cracking unit at Carter Oil Co.'s Billings, Mont., refinery, has been promoted to general superintendent in charge of operations at the refinery. He succeeds **H. G. Gunter** who recently was promoted to assistant manager of the manufacturing department. Burns has 16 years of experience in the manufacturing phase of the petroleum industry. He graduated from Montana State College in 1935, and joined Independent Oil & Gas Co. at Laurel, Mont., as a laboratory assistant. In 1937 he joined Northwest Refining Co. as chief chemist, leaving them in 1942 to join Carter.

E. B. Redpath, secretary of Ohio Oil Co. since 1928, was elected executive vice president at the board of directors meeting last week. **H. H. West,** formerly assistant to the president, was elected secretary to succeed Red-

PERSONALS

path. **C. A. Jackson,** assistant comptroller, was named assistant to the president. **F. L. Fox,** assistant secretary, was elected to the position of vice president.

E. H. Stephenson, field foreman for Seaboard Oil Co., has been transferred from Mount Vernon, Ill., to Sinton, Tex., in the same capacity.

Colbert H. Marshall has been elected to the newly created post of vice president of Ashland Oil & Refining Co. in charge of crude-oil production and related operations of the company. He joined Allied Oil Co. and its subsidiary, Central Pipeline Co., in 1942. Since their merger with Ashland in 1948, he has been general manager of Ashland's crude-oil procurement, production, and pipe-line operations in the Southwest.

Joe A. Peery, engineer at Alice, Tex., for Sunray Oil Corp., has been transferred to Lake Charles, La., as assistant production superintendent.

E. C. OVERBECK

Earl C. Overbeck has been named chairman of the board of directors and chief executive officer of Ohio Fuel Gas Co. succeeding **C. I. Weaver,** who recently retired. **William N. Grinstead** succeeds Overbeck as president, and **Allan W. Lundstrom** takes Grinstead's post as vice president and general manager.

John L. Creigh, reservoir engineer for Humble Oil & Refining Co., has been transferred from Pleasanton, Tex., to the Kelsey district at Encino, Tex.

Victor T. Jones, Jr., chief petroleum engineer at Lafayette, La., for Gulf Refining Co., has been transferred to Harvey, La.

Henry W. Hinkle, equipment engineer for Stanolind Oil & Gas Co. at Lubbock, Tex., has been transferred to Farmington, N. M., as petroleum engineer.

John M. Griffith has been appointed engineer of research for Asphalt Institute, succeeding **Prevost Hubbard,** who has retired.

E. B. Pope, toolpusher for Baker & Taylor Drilling Co., has been transferred from Synder to Midland, Tex.

Albert E. Benson, party chief for Amerada Petroleum Corp., has been transferred from Backwell, Okla., to Crossett, Ark.

Oscar Gower, toolpusher for Hondo Drilling Co., has been transferred from Snyder to Aspermont, Tex.

Frank T. Estep, foreman for Skelly Oil Co., has been transferred from Velma to Oklahoma City.

Howard D. Graham, vice president in charge of operations for Mississippi River Fuel Corp., has been elected a director of the corporation. He fills the vacancy created by the retirement of **Ben C. Comfort,** chairman of the board and director of the firm. The chairmanship will remain open. Comfort, one of the company's founders, will continue his affiliation in a consulting capacity.

Carl E. Cummings, superintendent of The Texas Co.'s Beacon laboratories, has been named commanding officer of the Quartermaster General's Petroleum Augmentation Unit. The unit, which was activated in November 1950, was established to provide a nucleus for rapid expansion of the army petroleum organization in the event of emergency.

W. H. Davis, engineer for Sohio Petroleum Co. at Centralia, Ill., has been transferred to the Kansas waterflood district with headquarters at Independence.

Kenneth Head has joined Amerada Petroleum Corp. at Billings, Mont., as geologist and engineer. He was formerly associated with **Homer Rutherford** and **R. E. Duty** at Mount Vernon, Ill.

R. I. McEfee is production manager of the new firm Keystone Oil Co., Inc., at Mount Vernon, Ill. **Harry Ames,** of Lincoln, Ill., is the firm's secretary-manager.

R. E. Duty, independent geologist at Mount Vernon, Ill., has announced he will move to Evansville, Ind., August 1.

Carl Miles, independent operator at Grayville, Ill., has moved his office to Abilene, Tex.

Ray Storms, petroleum engineer for the western division of Mene Grande Oil Co. with offices at Cabimas, Estado Zulia, Venezuela, has been promoted to production superintendent. He succeeds **R. S. Stephens,** who has been transferred to the eastern Venezuela division.

Kenneth Fricke, formerly in the geology department of Texas Oil Co. in Caracas, Venezuela, is now chief scout for that firm's affiliate in Bogota, Colombia.

Willis Ensign has resigned his position with Breuil Petroleum Co. at Buffalo, N. Y., and plans to become an independent operator in the Mount Vernon, Ill., area.

Philip L. Ferguson, geologist for Stanolind Oil & Gas Co., has been transferred from Hutchinson, Kans., to Casper, Wyo.

Earl Ainsworth, formerly with the Kansas Corporation Commission at Wichita, Kans., has joined Northern Natural Gas Co. of Omaha as a gas engineer.

Joe C. Darrow, superintendent of Lone Star Gas Co.'s Abilene, Tex., division, has been named general manager of the Fort Worth division to succeed **Floyd L. Carmichall,** who has resigned.

DEATHS

Henry London Taylor, 62, assistant manager of chemical sales for Lion Oil Co., died May 23 at Lumberton, N. C.

Jack C. Jones, 45, general superintendent of Humble Pipe Line Co., died in Houston May 22. Before joining Humble in 1928, he had been associated with Gulf Pipe Line Co. and Cities Service Oil Co.

James Willis Yeldell, 46, vice president in charge of operations for Southern Natural Gas Co., died May 21 at Birmingham, Ala. He was named vice president last August.

William F. Hannagan, pioneer Permian basin oil operator, died in Roswell, N. M., May 26. He had taken an active part in oil developing since 1920 operating in various parts of the West Texas-Southwest New Mexico territory.

William W. Walters, former salesman of oil well supplies for Layne & Bowler, died May 20 in Houston. He had been with the firm since 1903, retiring several years ago.

Gilbert McIntyre Esson, 69, of Petrolia, Ont., formerly a well known driller in the Canadian fields, died recently while working at the Polymer plant at Sarnia.

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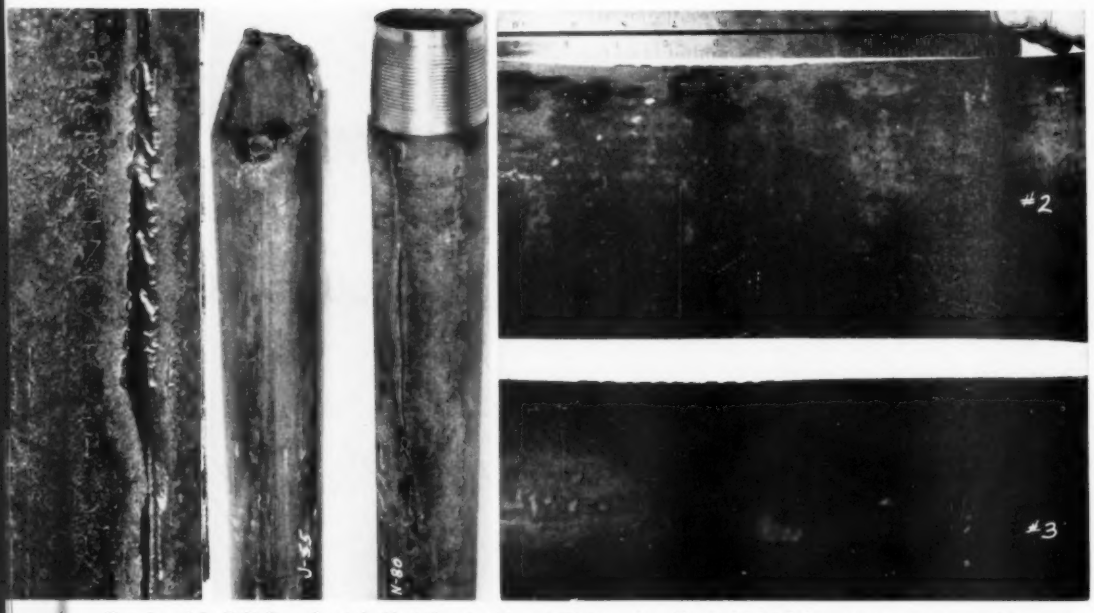


Figs. 1 and 2—(Left) Example of double failure in string of 5½-in. casing. Fig. 3—(Right) Deformation in casing caused by tongs.

What Causes Tubular Failures?

Here are described a few oil-well tubular troubles considered interesting and unusual

by D. C. Neely

1. Casing Failure

(Figs. 1, 2, 3, and 4)

THIS case involves a double failure in one string of 5½-in. casing; one a split near the pin end of a length of "Extreme Line" and the other a break at the last engaged thread under a coupling. The sequence of the two failures is unknown, but the final deductions were interesting.

In the nippling-up operation the full weight of the casing was slacked off after the cement had hardened and then picked up to equal a slack-off of 25 per cent of the weight originally shown on the indicator. It was believed that in so doing the 5½-in. casing bent into a large cavity a short distance below the 9⅝-in. outer string set at 5,200 ft. and caused the last engaged thread to crack. The well was brought in and had a shut-in pressure of 4,600 psi. About 2 days later the pressure equalized in the 5½-in. and 9⅝-in., indicating some kind of leak in the 5½-in. casing. A pull was made and the amount of casing down to the broken joint was removed from the hole.

Oddly enough, it was then found that the top length of Extreme Line was split (Figs. 1 and 2). The fractured end of the threaded and coupled length is shown in Fig. 2, but had been battered by washover pipe. The split length was deeply scarred and crushed somewhat by tongs when being recovered from a previous well (Fig. 3). We were not at first aware that this was rerun casing. The failure occurred in the tong marks, and it was concluded that the pressure plus the notch effect plus deformation induced the split. As an experiment and to study the reason for failure, other tong-marked lengths which were on the racks were burst at our mill. They failed along the line of tong scars and at pressures much lower than the minimum ultimate for this weight and grade (Fig. 4.)

2. Casing Failure

(Figs. 5, 6, and 7)

THE following casing failure was unusual since it was caused by a pipe defect. This was somewhat similar to the case in Item 1, in that the well was shut in when a split in the 5½-in. 17.00-lb. N-80 casing occurred. The pressure reading in the casing had been 2,500 psi. When this much pressure exploded into the 9⅝-in. outer string a nipple which connected into the casing head bulged from 9⅝-in. to 10¾-in. (Fig. 7). Had it split, a wild well would have resulted.

The split length of 5½-in. was recovered and a laboratory analysis made. The examination disclosed the presence of carbon segregation at the inner surface. This zone possessed low transverse ductility which might contain longitudinal cracks and reduce bursting strength (note Fig. 5). The dark area of carbon segregation can be seen on the inner wall. The hardness at one point is a maximum of 289 to a low 231 farther out. Approximately 240 is average, and 289 is beyond our mill's cumulative frequency curves for this grade of steel.

The split is shown in Fig. 6. The arrows point to the start of the frac-

Fig. 4—Failures along line of tong scars. Test performed at mill.

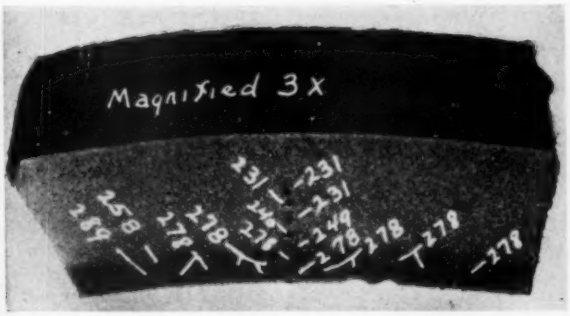


Fig. 5—Section of split 5½-in. casing used in laboratory tests.

ture and the dark area can again be noticed. The failure began to tear transversely on each end, which tends to indicate low ductility.

If this string of casing had been high-pressure tested prior to running to the new alternative A.P.I. figure of 80 per cent of the minimum yield strength, there is no doubt that the defective length would have burst at a pressure much less than this. The 80 per cent figure for this particular material is 7,100 psi.

Some time this year I feel quite sure that most or all of the larger tube companies will be equipped to high-pressure test tubular material. This of course necessitates an extra but nominal charge. All oil-company engineers, superintendents, etc., that we have talked with are highly in favor of this as good insurance against troubles.

3. Drill-Pipe Failures

(Figs. 8, 9, and 10)

THE following failures were the result of the use of very old-style rubber protectors on 4½-in. drill pipe. I hasten to add that when this difficulty developed the protector manufacturers had already changed the design several years before to prevent the phenomenon, but this was not

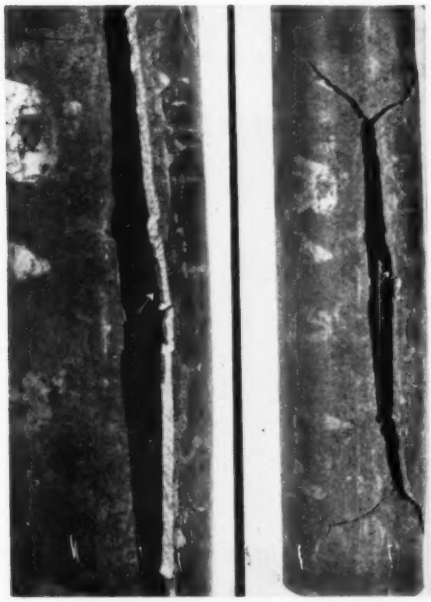


Fig. 6—Arrows point to start of fracture.

Fig. 7

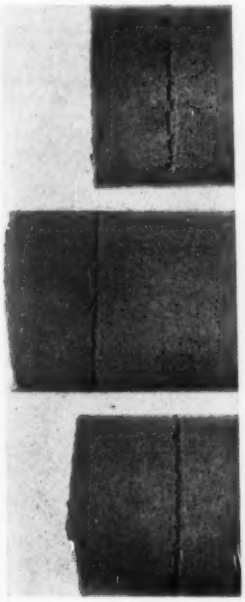
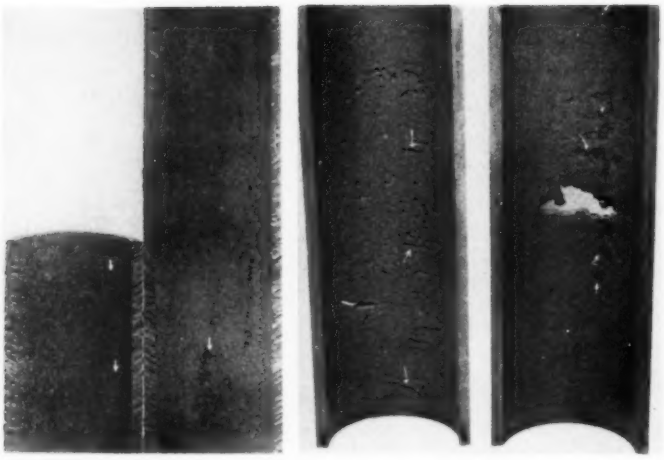


Fig. 8



Figs. 9 and 10—Arrows point to corrosion fatigue pits.

known by the company drilling the well.*

A corrosive circulating fluid was being used. A transverse break occurred at the very top of one protector. A rather rough groove was present around the pipe at this point. Upon investigation a great many other similar grooves were noted at the top of protectors (Fig. 8).

This ring corrosion was evidently a result of the presence of corrosive fluid in the ledge and crevice of the top end of the protector. As the pipe stood in the derrick, pitting took place. This was prevented by the extension of a thin lip at each end of the protector which fits tightly. Thus fluid cannot become trapped. Besides the cost of the protectors, about 2,000 ft. of pipe had to be junked—at least for use as drill pipe.

Incidentally, severe inside corrosion fatigue occurred in this string, although this is not unusual. (Fig. 9. Just to show a photo of more severe corrosion fatigue note Fig. 10.) An internally plastic-coated string was substituted to finish the well and no further corrosion pitting developed. Of course, new-style protectors were put on this string.

*This was discussed in "Causes and Prevention of Drill-Pipe and Tool-Joint Troubles," R. S. Grant and H. G. Texter, A.P.I. Drilling and Production Practice, 9-48 (1941).

4. Drill-Pipe Failures

(Figs. 11 and 12)

SOME 10 to 15 years ago the main cause of drill-pipe failure might have been considered as being notch fatigue, mainly in slip-mark scores. The reason for this was the "V" type serrations which made transverse sharp-bottomed scars (Fig. 12). Shortly thereafter the slip manufacturers designed dies which resembled knurling and practically eliminated notch fatigue failures.

However, just a few months ago a contractor experienced five or six failures in slip scores made by present-day slips (Fig. 11). The cause was apparent since evidence showed that the pipe had rotated in the slips while making and breaking the tool joints without using backup tongs, and many fairly new lengths of drill pipe were ruined.

5. Drill-Pipe Failure

(Fig. 13)

THE only longitudinal washed-out crack I have ever seen in drill pipe is that shown in Fig. 13. All others were transverse. A laboratory analysis was made and all properties were excellent. The only theory I can advance is that the crack started circumferentially and then washed out along a very short deep seam, and thus followed the line of least resistance. Perhaps this occurred while circulating and with the pipe stationary. Otherwise, the crack should have proceeded and washed out transversely.

(Continued on page 116)

Fig. 11

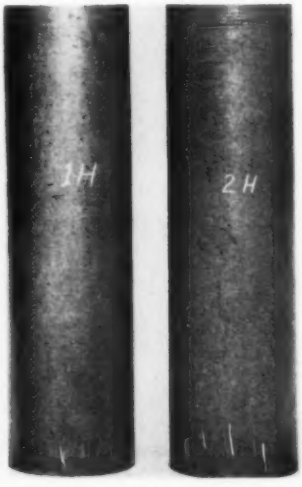


Fig. 12

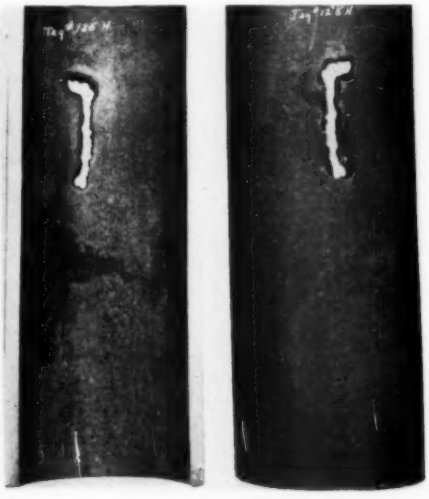


Fig. 13

CANADA'S LLOYDMINSTER AREA

Canada's largest black-oil producing area offers favorable economics for newcomers

by Stuart P. King

THE Lloydminster area, straddling the Alberta-Saskatchewan boundary, is Canada's largest black-oil producing area. Here lies the answer to a newcomer company's problem of how to cover the overhead and exploratory expense involved in the discovery and development of reserves of light oil.

In the Devonian plays of Alberta the high price of land acquisition; the limited production history available for predicting reservoir performance and recoverable reserve; the discounting effects of proration and anticipated permanent well-head price decreases; and the comparative risk ratio and cost of dry holes so influence a "young" operator that he is usually outbid by a substantial margin at Crown sales and on farmout or purchase deals.

In the Lloydminster area, however, the reverse is found to be true. Proven acreage can be acquired cheaply; considerable production history (4 to 6 years) is available for estimating recoverable reserves; production is not only not prorated but, as indicated by increases totaling 31 per cent in well-head prices within the past 6 months, a severe shortage exists; payouts are fast; and dry-hole costs are only 10 to 17 per cent of those in the current light-oil plays.

It is believed that there is a stable and remunerative future for the western Canadian producer of black oil. Refined primarily for the purpose of marketing asphalt, railway diesel and fuel oil, and domestic burner oils, an optimistic view towards the future stability of the market for these products seems justified when the following factors are considered.

1. Statistics for 1947 (Canada Year Book—1950) showed that of a total of 384,855 miles of roads in three western Canadian provinces of Alberta, Saskatchewan, and Manitoba, only 1,659 miles (less than ½ per cent) were hard surfaced. During the past 3 years, this condition has been materially improved, especially in oil-rich Alberta, where $16,000,000 has been allotted to road surfacing, maintenance, and construction in 1951.

The total area of these three provinces is in excess of 700,000 sq. miles of which more than 300,000 sq. miles are agricultural lands. This latter area is almost equal to the combined total area of Texas and Oklahoma wherein development of hard-surfaced highways during the past 20 years has been tremendous. It is not at all unreasonable to expect that western Canada will enjoy the same type of road building program during the next 20 years.

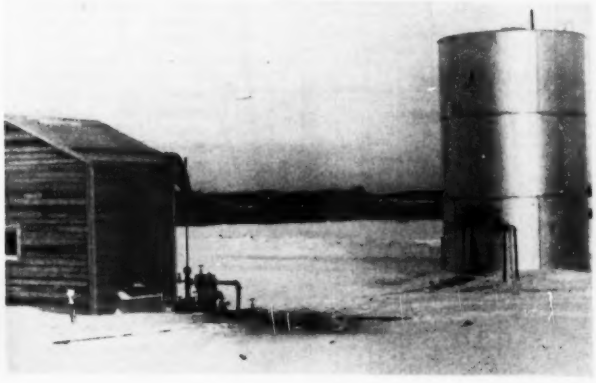
It is common knowledge that as-

THE AUTHOR

Stuart King, president of Albercan Oil Corp., Calgary, Alta., Canada, was born in Calgary and graduated from University of Southern California as petroleum engineer in 1941. He worked in Trinidad for Trinidad Leaseholds, Ltd., until 1944 when he became a district petroleum engineer for Creole Petroleum Corp. in Venezuela. In 1948 King returned to Calgary and became vice president of Franco Oils, Ltd., in charge of all operations. He joined Albercan in 1950.

Brewster N-3 portable drilling rig currently used for developing Lloydminster area.

Typical pumping unit installation in the Lloydminster area and 750-bbl. heated storage tank. House over pumping unit is to protect engine and vital bearings from driving snow, etc. To right of well head is an insulated improvised heater with which exhaust from engine heats casing-head gas which runs pumping-unit motor.



phalt is the best available surfacing material in this land of extreme climates. Black oil, on the other hand, makes the best road-building asphalt; 1 mile of hard-surfaced road requires 460 bbl. of asphalt which, in turn, requires 1,380 bbl. of black oil for its manufacture. In the event the discovery ratio of light crude continues, and there is reason to expect that it will, revenue derived from royalty and sale of Crown reserve lands will be available to the provincial governments for the purpose of financing road construction and the demand for black oil may far surpass current estimates.

2. Five years ago, Canadian consumption of oil by railway locomotives was just over 2 million barrels, while consumption in 1950 was almost 7½ million barrels. Production of Canadian locomotive plants is now switching almost entirely to diesel or oil-fired locomotives. Black oil is the "natural" source of supply for Bunker C; and winter diesel fuels refined from this crude have the competitive advantage of asphaltic base and low pour point.

Diesel-fuel-oil consumption has doubled since 1946 and there is little reason to believe that this rate of growth will not continue. Western Canada, with its long freight hauls and increasing agricultural mechanization, provides a substantial diesel-oil market. Black-oil refineries located in the center of this demand and close to a supply of crude are bound to prosper. They do not compete with, but rather they complement, light-crude refineries.

3. The use of oil in home and industrial heating in Canada has increased 3.5 times during the past 10 years. An indication of the current rate of increase in consumption in western Canada is obtainable from statistics issued by the city of Saskatoon, Sask. The number of private homes in that city heated by oil-burning furnaces increased in 1950 from 1,767 to 2,617, an increase of 50 per cent. The increase from 561 oil burners in 1947 represent a percentage increase of over 274 for that period. The Hi-Way Refinery at Saskatoon, one of the largest refiners of western Canadian black oil, is perhaps the main reason for this considerable increase in the consumption of domestic fuel oil in that city.

4. Specialty products made from top-grade asphalt will become more and more in demand as western Canadian industrial development expands. The completion of a roofing-company plant at Lloydminster which will process 330 bbl. per day is a good example of this trend.

The Lloydminster area has been mildly active since 1946, deliveries of crude for the past 4 years being as follows:

Year	Barrels—Production	Barrels—Daily average
1947	848,482	2,325
1948	1,496,804	4,090
1949	1,496,842	4,101
1950	1,894,015	5,189

Cumulative production for the area to December 31, 1950, was 6,047,446 bbl. Current production is maintained by approximately 300 wells capable of efficient and economical production.

Existing regional refinery capacity for this production is approximately as follows:

Company and location—	Barrels daily
Husky Oil & Refining, Ltd., Lloydminster	7,500
Excelsior Refineries, Ltd., Lloydminster	3,000
Hi-Way Refineries, Ltd., Saskatoon	1,200
Imperial Oil, Ltd., Regina	600
Prince Albert Refining Co., Prince Albert	1,000
Supreme Refineries, Ltd., Calgary	500
Total	13,800

It is evident from the above that refinery capacity is at least double existing average daily production of the Lloydminster area. However, deliveries to these refineries fluctuate considerably with the seasons, being very heavy in the spring and summer months when large amounts of asphalt are run for road constructions, and tapering off during the fall and winter when fuel and burner oils are the refined products of this crude which are in greatest demand.

The fundamental factor which controls the economics of production and the rate of development of this type of oil is the well-head price. Until October 1, 1950, the price paid to the producer for oil delivered to the refiner was marginal. Efficient producers made some profit, but were reluctant to do any further development drilling.

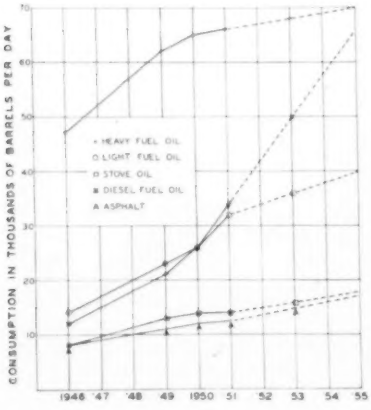
On October 1, 1950, Husky Oil & Refining, Ltd., at Lloydminster, which nominally sets the price for this area, increased the price from $1.13 to $1.48 per barrel of Lone Rock crude delivered to Lloydminster. Franco Oils, which operates a cleaning and desalting plant at Lone Rock and is the largest producer in the Lloydminster area, followed suit.

Trucking charges for the area as a whole average about $0.13 per barrel, allowing the producer a well-head price of $1.35 per barrel. At this well-head price, low drilling, completion, and operating costs on efficiently managed leases can justify a present worth of net reserve somewhere between $0.50 and $0.60 per barrel. Unless market prices for products refined from this oil can support this well-head price, very little or no development can be anticipated.

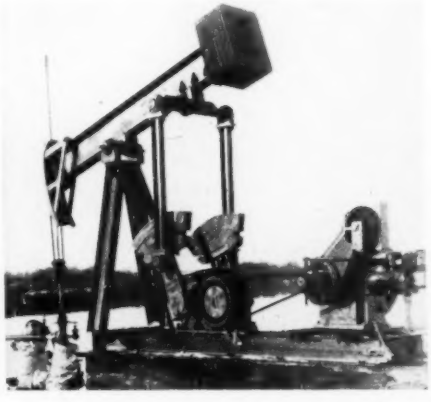
Because the physical characteristics of this oil eliminate the use of pipe lines as a means of transportation to the refineries, all transport is carried on by tank trucks or railway tank cars. As both of these methods are expensive, and railway transportation costs seem to be subject to periodic increases, black oil must fit into a relatively small regional economy.

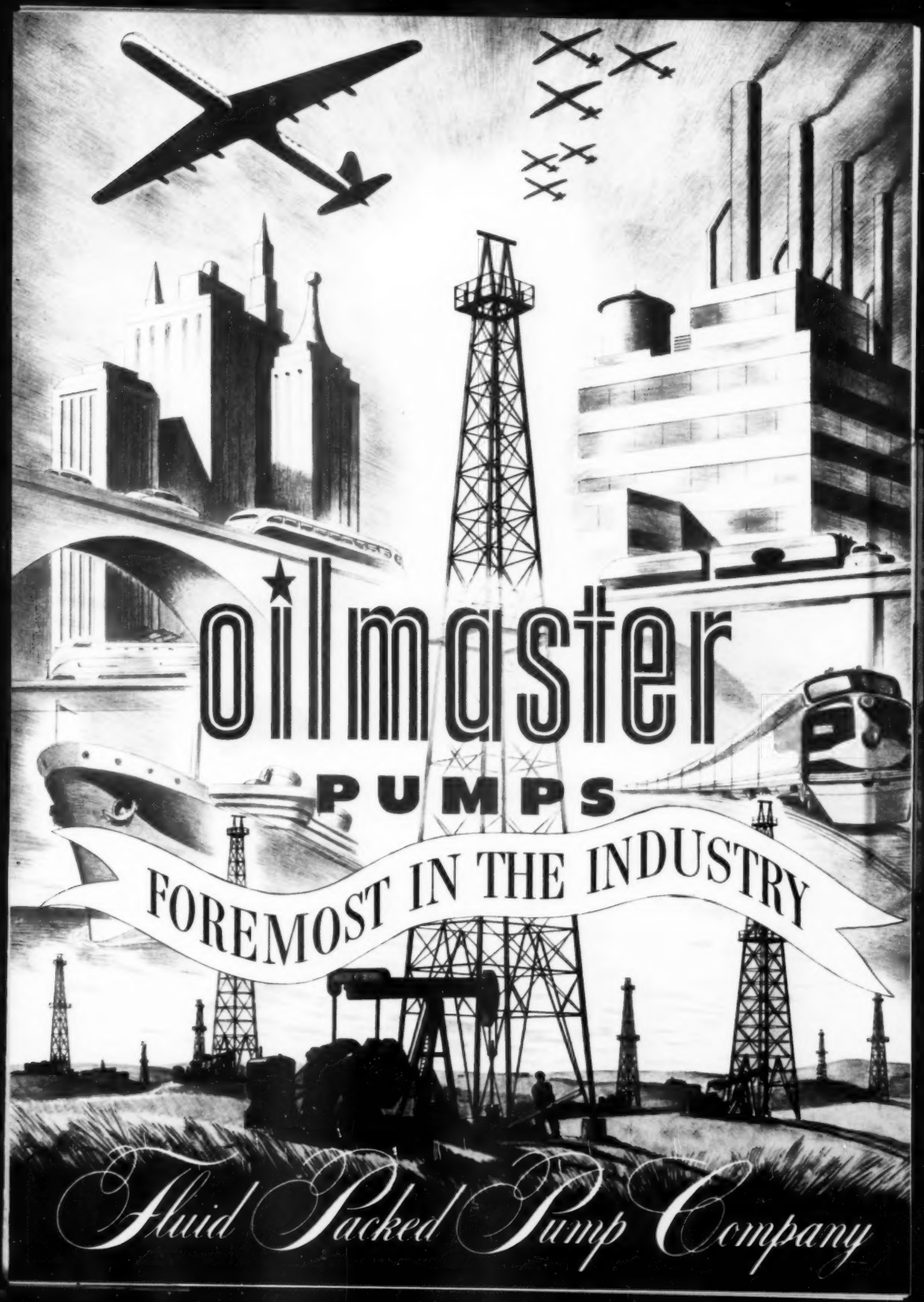
A field with good wells and low operating costs is economical to produce only if it is located within a reasonable distance of a refinery proc-

(Continued on page 87)



Left: Actual and estimated consumption of products which can be refined from black oil and sold competitively in certain areas of western Canada. These statistics are for the whole of Canada and the rate of growth indicated is considered to be a minimum for western Canadian black oil. Right: Close-up of a pumping unit, complete with engine exhaust gas heater before house is put over unit. Unit is mounted on timbers. Unit will be mounted on cement base in the spring.

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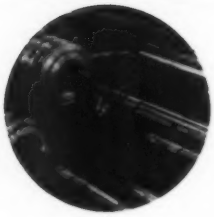

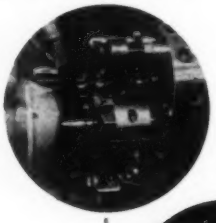

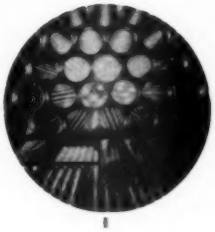

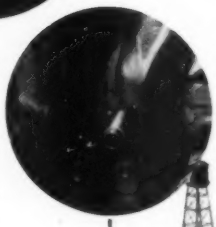

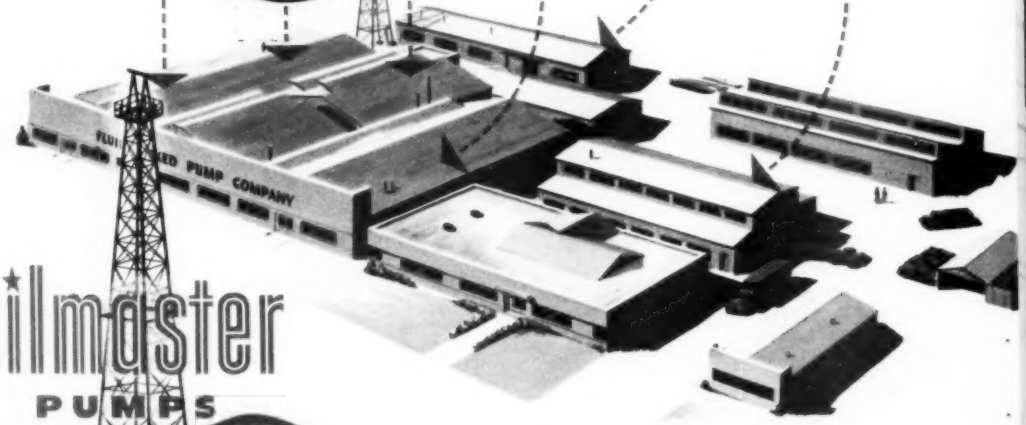

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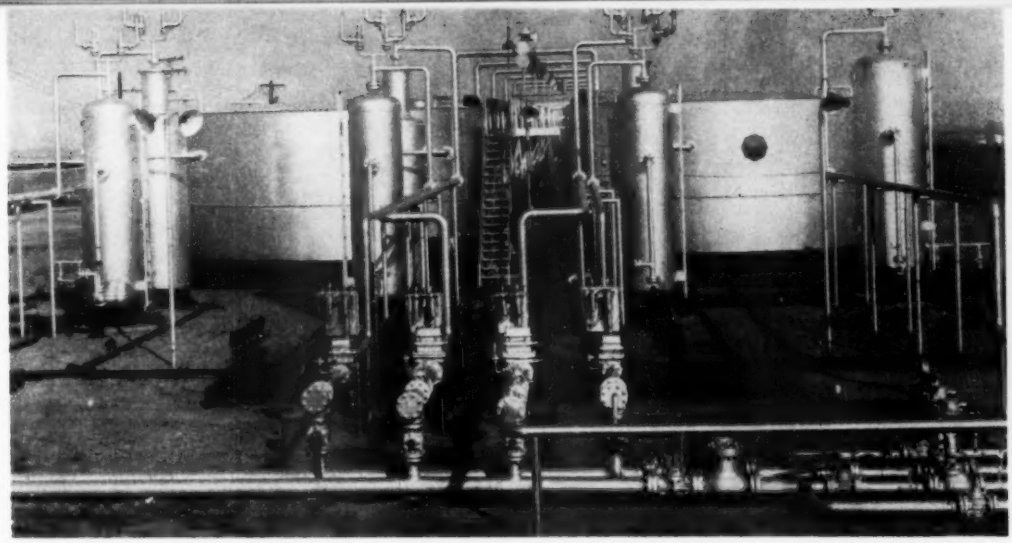


Separators and 13-tank installation at Sunray's Dessel lease. Recovery equipment here collects over 200 M.c.f. of tank vapors daily.

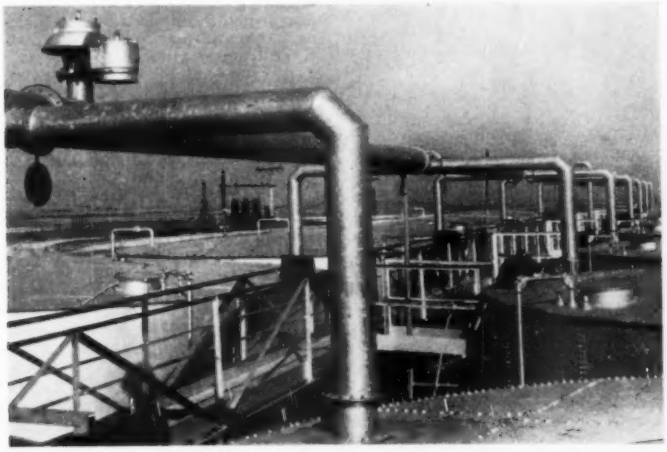
Tank-Vapor Recovery at Guijarral Hills Effects Payout in Few Months

by D. H. Stormont
California District Editor

NO. 3 OF THREE-PART SERIES

THE tank-vapor recovery systems provided by Sunray Oil Corp. at its Guijarral Hills properties, Fresno County, California, are outstanding from the viewpoint of their design considerations. Likewise their performance has been exceptional; installed about a year ago, a payout was effected within a very few months.

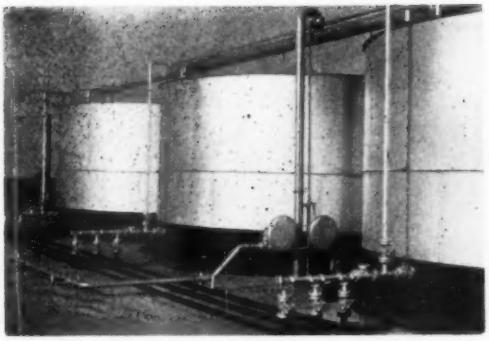
The recovery systems were installed at four batteries, which handle production of 40 wells. The collecting lines installed were so designed that all vapors could readily move through the system with minimum flow resistance. The regulators used to control vapor flow from the tanks into field vacuum lines, and to permit repressuring with dry gas when vacuum is created in the system, have performed these functions without failure although operating within a few tenths of an inch of water above and below atmospheric pressure.



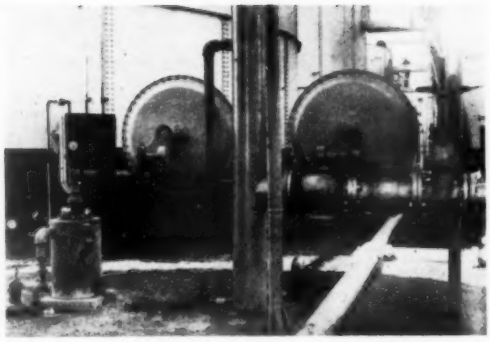
Balance and lateral lines at the Dessel lease, as at all batteries, are of "thin skin" pipe, streamlined to reduce resistance to flow of vapors.

Air is excluded from the tanks at all times, resulting in reduced explosion hazards and internal corrosion of the lines and tanks. Use of conservation vents, explosion relief valves, and weighted hatches assures that all vapors will be collected without endangering the tanks to rupture or collapse. An additional aid to vapor conservation is the use of automatic, ground-level tank gages.

Crude produced from the company's 40 Guijarral Hills wells is either one or two-stage separated as well pressures require. Trap-separated gas contains, on an average, about 1.35 gal. of isobutane plus per thousand cubic feet. Gas from the high-pressure traps (about 520 psi.) averages about 0.87 gal. per thousand cubic feet, that from the reduced high-pressure traps (200



Recovery system at the three-tank Sanger lease which yields slightly over 30 M.c.f. of vapors daily. The diaphragm-type regulators at the base of the vapor takeoff line control the flow of vapors from the tanks and dry gas into the collecting system.



Regulator installation at the Dessel battery. The regulator at right controls the flow of vapors from the system through the 6-in. valve into the vacuum line. The left regulator permits dry gas to flow into system whenever shipping results in a vacuum being created.

TABLE 1—RECOVERY RECORD OF GUIJARRAL HILLS VAPOR-COLLECTING SYSTEMS

	Smith (five 1,600-bbl. tanks)		Dessel (thirteen 1,600-bbl. tanks)		Allison (six 1,600-bbl. tanks)		Sanger (three 1,600-bbl. tanks)		Total vapor per month (M.c.f.)	Total Liquids per month (gal.)†
1950—	Vapors (M.c.f.)	Liquids (gal.)	Vapors (M.c.f.)	Liquids (gal.)	Vapors (M.c.f.)	Liquids (gal.)	Vapors (M.c.f.)	Liquids (gal.)		
March*	1,205	9,905	5,141	45,446	1,456	11,663	716	6,122	8,518	73,136
April	1,185	10,440	6,567	75,849	1,782	15,717	1,020	9,078	10,554	111,084
May	2,218	22,180	8,338	76,793	2,628	21,576	1,593	13,270	14,777	133,819
June	2,307	23,347	8,202	82,512	2,831	25,100	1,636	16,049	14,776	147,008
July	2,263	25,889	9,268	118,430	2,521	27,555	1,862	19,179	15,914	191,053
August	2,090	25,414	9,052	122,564	3,069	38,761	1,871	23,743	16,082	210,482
September	1,710	20,281	8,091	105,264	2,255	26,361	1,396	16,487	13,452	168,393
October	1,068	10,990	6,107	63,269	2,438	24,770	970	9,613	10,583	108,642
November	1,248	12,418	6,464	64,056	2,322	22,268	1,086	11,794	11,120	110,536
December	1,412	12,793	6,396	58,907	2,033	17,626	1,055	8,482	10,896	97,808
1951—										
January	1,246	10,703	6,303	60,131	1,569	13,070	1,110	10,290	10,228	94,194
Total	17,952	184,360	79,929	873,223	24,704	244,467	14,315	144,107	136,900	1,446,157

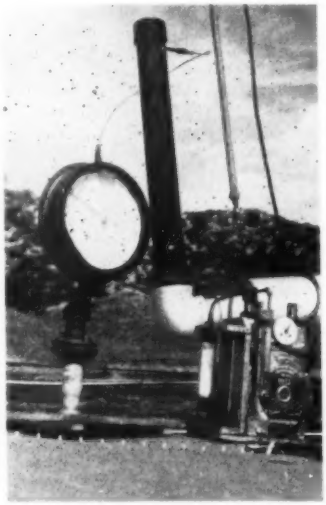
*After March 7 when project was placed in operation. †Liquid content includes only isobutane and heaviers; no credit given to propane content.

psi.) about 1.3 gal., and the low-pressure gas (at about 60 psi.) contains approximately 2.3 gal. per thousand cubic feet. Gross gas-oil ratio ranges from around 1,000 to 1,400 cu. ft. per barrel.

During the past year, in which an average of approximately 8,500 bbl. of crude oil was produced daily, tanks vapors collected at the four batteries ranged from around 325 to about 500 M.c.f. daily. Or their collection resulted in the gas recovery being increased by 45 to 60 cu. ft. per barrel of crude oil. An average of about 10.6 gal. of isobutane and heavier plus an additional 7.5 gal. of propane are contained per thousand cubic feet of vapors.

Vapors collected monthly during the first 11 months' operation are summarized in Table 1. During July it will be noted that 15,914 M.c.f. of tank vapors was recovered. In that month 259,850 bbl. of crude oil was produced along with 264,902 M.c.f. of gas, including tank vapors. Thus the gross gas-oil ratio was 1,020 cu. ft. per barrel of which 61 cu. ft. was tank vapors.

These operations were on the high side, as a result of the hot July days causing more vapors to be flashed from the crude. During the past February when the gross gas-oil ratio averaged 1,370 cu. ft. per barrel, tank vapor-recovery operations yielded only 44 cu. ft. per barrel of crude oil.



Test equipment used in determining the volume and content of the vapors available at a tank battery. Selection of the proper size orifice in the open-flow well tester permitted back pressures of a few ounces to be held on the tanks.

As shown in the table, through last January a total of 136,900 M.c.f. of vapors had been conserved at the four systems. Their recovery resulted in a calculated yield of 1,446,157 gal. of isobutane plus. At an estimated price of 6 cents per gallon for the isobutane and heavier and 16 cents per thousand cubic feet for dry residue gas, assuming shrinkage and lease fuel uses resulted in a 35 per cent reduction, the value of the vapors would be about $101,000.

Total cost of vapor-recovery equipment at the four batteries, including all design and installation costs on a turnkey basis, was approximately $13,000. Cost per battery ranged form $5,300 for the 13-tank Dessel lease to $2,000 for the 3-tank Sanger lease. Without going into royalty and processing-charge provisions, it is readily apparent that a quick return was made on the investment.

Design Considerations

Before deciding to install the recovery equipment, Sunray's natural-gas personnel made a thorough study

of the vapors available at each battery and their average liquid content. Having determined these, the size piping required to effect their recovery, at a pressure drop within the range of the pressure and vacuum vent-valve setting, was then worked out.

To determine the volume of vapors available a recording manometer and open-flow well tester were used rather than the conventional recording orifice meter. Through use of this equipment back pressures in the normal operating range of the recovery systems could be held on the tanks. Liquid content of the vapors was determined through use of standard charcoal test equipment.

The equipment was set up as shown in an accompanying photograph. The recording manometer used gave readings to 0.1 in. water in the range of 0 to 10 in. For the open-flow well tester, orifice plates ranging in size from ¼ to 2½ in. were available. The size orifice which would result in a back pressure within the setting of the hatch pressure relief vent (6 oz.) was chosen through trial.

With the proper size orifice in place, the test was continued until a straight line was being recorded on the chart. Usually this was accomplished in about 2 hours. Needless to say close cooperation of the producing department was required in these tests. Taking into consideration the volume of oil pumped during the test, the true volume of vapors emitted hourly from a battery was then determined from the chart.

Survey of the Dessel battery, which handles the output of 15 wells and consists of thirteen 1,600-bbl. tanks placed in two rows, showed about 450 M.c.f. of vapors available daily. To keep the pressure drop through the system within the range at which it was desired to have the relief valves function (¾ oz. pressure and ½ oz. vacuum), it was decided to use a 12-in. header with 8-in. laterals to each tank. This size piping provided for possible future expansion and for sudden overloads of about 50 per cent above the designed capacity.

At the other three batteries, the sizes of which are given in Table 1, the volume of vapors available did not require such large piping. For these, 8-in. headers and 6-in. laterals were used. Likewise, to keep flow resistances as low as possible, streamlined fittings were used throughout the collecting systems.

The arrangement of the two Varec regulators at each battery is more or less typical. Pressure changes in the system are transmitted to the regulators, one of which controls the flow of wet gas from the system and the other the flow of dry gas used in repressuring, through a 2-in. control line. This line is connected to the balance line at the point where the takeoff line is joined. Since the control point is 25 ft. upstream from the regulators, there is less tendency for a regulator to open and then quickly close as the pressure (or vacuum) is reduced.

When sufficient vapors accumulate in the collecting system to create a pressure greater than 0.2 in. water on the face of the regulator diaphragm, the latter operates through a linkage system to start opening a valve in the wet-gas line. If pressure continues to build up in the system, the diaphragm continues opening the valve until at 0.5 in. above atmospheric pressure the valve is wide open. In other words, only 0.3-in. water pressure is required to change the valve from closed to a fully open position.

As long as the valve is open, vapors are siphoned off by the vacuum line. When the pressure drops to the regulator setting of 0.2 in., the valve closes and flow of vapors from the system ceases. Should vapors accumulate too fast in the system, as would be the case if a trap valve sticks and throws the full gas load into the battery, the conservation vent would open at 0.75 oz. If pressures continued to build up, the explosion relief valve would function at 5 oz. (about 10 in. water).

Should shipping activities result in pressure at the control point being reduced to 0.1 in. water below atmospheric pressure, such vacuum is applied through the control line to the diaphragm of the repressuring regulator. Its action causes a 2-in. valve in the dry-gas line to start opening. As in the wet-gas regulator a pressure differential of only 0.3 in. is required to position the dry-gas valve fully open.

While dry gas is available at the Guijarral Hills tanks for repressuring, being taken from the low-pressure gas line and reduced to 35 psi. in an auxiliary regulator, it seldom is used. Sufficient gas usually is available within a system to offset any vacuum being created by a tank being shipped.

During the approximately 1-year period the systems have been in operation they have given trouble-free service and performed as anticipated. Maintenance has consisted primarily of periodic inspections of the regulators.

Canada's Lloydminster Area

(Continued from page 82)

essing black oil. Tank trucks haul a barrel of oil from 6 cents to 1 cent per mile, depending upon the length of haul. Railway tank-car rates vary with the length of haul and the ultimate destination from ½ cent to ¼ cent per mile per barrel. Tank-truck rate from Lone Rock to Lloydminster is $0.23 per barrel for a 23-mile haul. Railway tank-car rates approximate $0.75 per barrel for the 150-mile haul from Lone Rock to Saskatoon or the 315-mile haul to Regina; while the intermediate 200 miles to Prince Albert rate is $1.03 per barrel, the same as the rate to Moose Jaw some 275 miles from the field.

Lone Rock field is perhaps the most profitable pool in the area. The crude has the highest gravity, thereby commanding the top price, and the production costs are low. The wells in this field produce from one of four Lower Cretaceous sands, usually designated Lone Rock 1, 2, 3, and 4 sands. Total depth to explore all sands is usually less than 2,000 ft. Wells are drilled and cased in less than 4 days and completed with small service rigs in 3 days.

An average producing well completely equipped (tankage, lease roads, etc., included) cost approximately $22,000. Initial potentials of Abercan's 13 completions to date have varied from 225 bbl. daily flowing to 48 bbl. daily pumping. Estimated average payout period is 20 months, based on a net profit before depletion and depreciation of $1.08 per barrel. Complete production and servicing supervision can be contracted for at $0.12 per barrel. Delivery to Franco Oils cleaning plant costs $0.065 by tank truck and royalty and overhead charges average $0.215 per barrel.

The general characteristics of the crude in Lone Rock field are as follows:

Specific gravity, 60/60	0.951
A.P.I. gravity, 60° F.	17.3
Color	Black
Pour point	Below 0° F.
S.U.V. at 77° F., sec.	1,900
S.U.V. at 100° F., sec.	1,000
Cleveland open cup:	
Flash, °F.	140
Fire, °F.	155
Per cent sulfur	3.43
Conradson carbon residue, per cent by weight	10.2

Yield of products as indicated by laboratory analysis are as follows:

	Per cent
A. By topping to road oil or fuel oil (1):	
320°-e.p. straightrun gasoline	7.01
392°-e.p. straightrun gasoline	12.86
470°-e.p. distillate	6.13
Fuel or road oil	80.86
Loss	0.15
B. By topping to road oil or fuel oil (2):	
320°-e.p. straightrun gasoline	7.01
455°-e.p. wide range distillate	10.92
Fuel or road oil	81.99
Loss	0.08
C. Production of lube-oil stock:	
392°-e.p. straightrun gasoline	12.86
470°-e.p. distillate	6.13
Gas oil	10.35
Lube-oil stock	18.28
Heavy fuel oil or road oil*	52.24
Loss	0.14
D. By cracking to 6° bottoms:	
392°-e.p. straightrun gasoline	12.86
400°-e.p. cracked gasoline†	27.86
470°-e.p. kerosine distillate	6.13
6° railroad fuel and gas	53.00
Loss	0.15
E. By cracking to coke:	
392°-e.p. straightrun gasoline	12.86
400°-e.p. cracked gasoline	43.57
Recycle stock	17.43
Gas and coke	26.14
F. Asphalt:	
Minimum yield—39 per cent of 100 penetration asphalt.	

*Equivalent to 6° railroad fuel, or bottoms. †By Nelson's formula.

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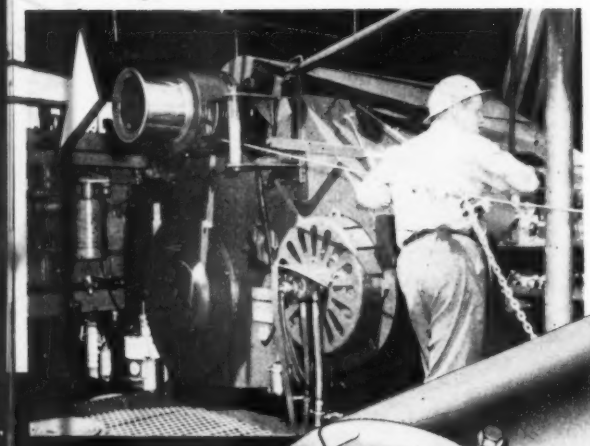

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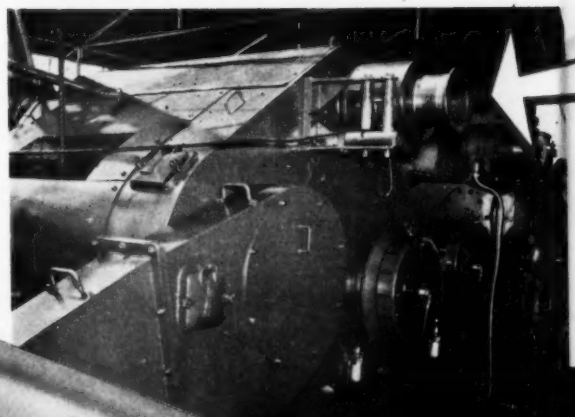

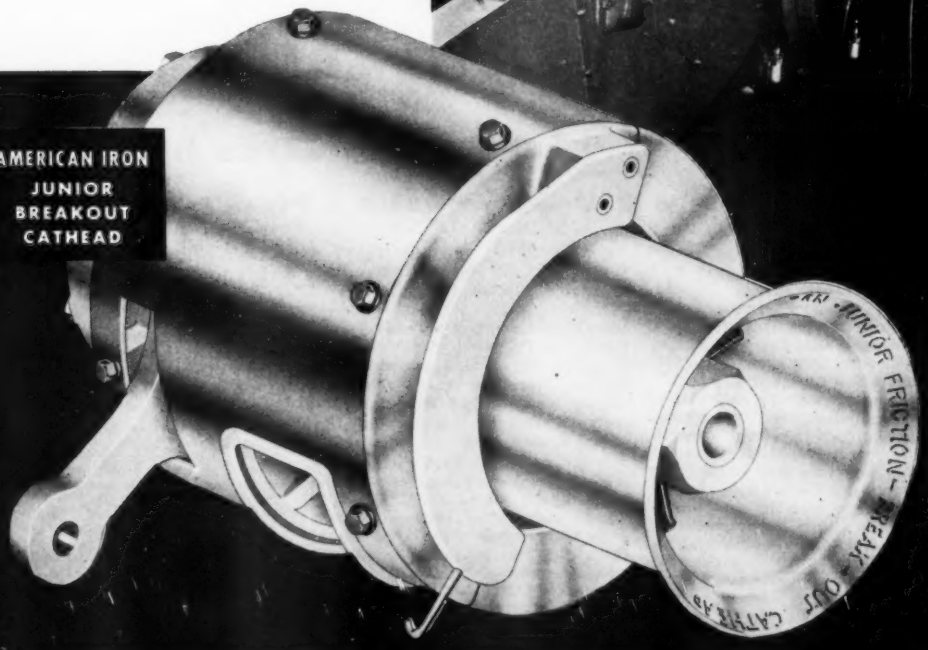

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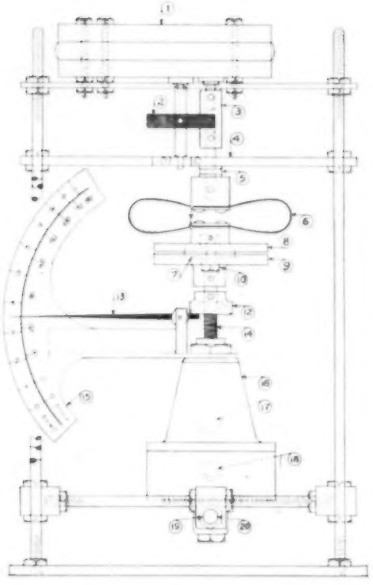

Fig. 1—Drawing of clock-driven regulator showing principal components.

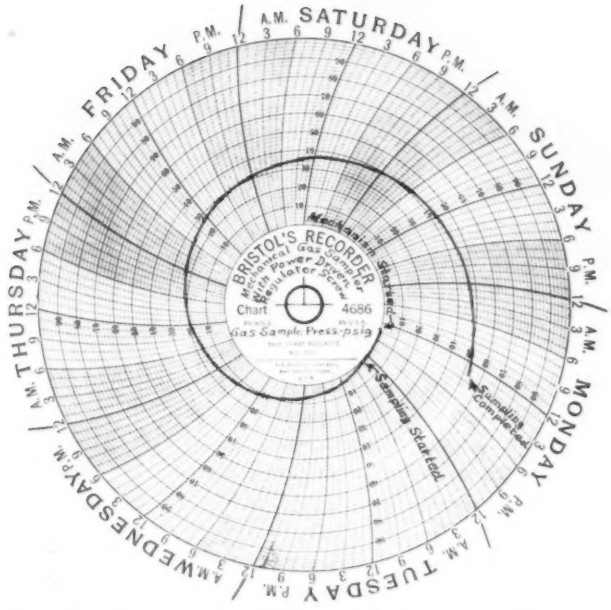

Fig. 3—Typical chart record of gas pressure change within the sample container.

Here's an interesting and practical device for

Mechanical Sampling of Fuel Gases

in transmission and distribution systems

by W. A. McGlashen* and J. S. Powell*

THE continuously increasing demand for more accurate measurement of the heating value, specific gravity, and other physical properties of gases has resulted in the necessity for more frequent sampling and testing of gases flowing through transmission and distribution pipe lines.

The procurement or development of suitable equipment and procedures for sampling fuel gases is a problem requiring careful consideration of functional requirements as well as other practical considerations such as the comparative costs of obtaining a sample of the source gas by mechanical means and that for obtaining an equivalent sample by the manual manipulation of equipment.

The most common method of gas sampling, herein referred to as the manual method, consists of the manual operation of valves to inject at each sampling location once each day for a selected number of days a sufficient volume of gas from the sample source into a portable sample container. Pressure within the container is increased a predetermined amount depending on the volume of sample required and the number of days selected for the accumulation of the sample.

It is recognized that this manual method of gas sampling results in the accumulation of a series of daily "spot" samples of the source gas, each taken over a short period of time. Its use in sampling gas at widely separated points in a large transmission and distribution system necessitates that an operator travel many miles to perform the daily operations at each sampling point. Cost for the application of this manual method of gas sampling is an important consideration.

*Southern California Gas Co. Portion of paper presented at Technical Service Conference, Pacific Coast Gas Association, Los Angeles, March 1951.

Special Equipment

Special equipment for collecting a sample of gas in a portable container by mechanical means is illustrated in Fig. 1. This apparatus consists of a gas-pressure regulator and spring-driven mechanism for the adjustment of the regulator screw at a constant rate.

In Fig. 1, item (1) is a standard-type, spring-powered Macnic chart-drive with counterclockwise chart rotation of one revolution in 24 hours. This drive will operate satisfactorily at torques considerably higher than those usually required, and since its mechanism is enclosed in a sealed case, it will operate satisfactorily under severe ambient conditions. The clock is secured to a metal plate which is supported by six vertical rods and nuts by which the drive-mounting plate can be adjusted to place the spring winding and drive shafts in the correct operating position with respect to the regulator screw-drive mechanism and connecting members.

Item (2) is a device by which the chart-drive spring can be easily rewound. The device consists of a section of spring-winding key extending between the spring-

winding shaft and a supporting bracket on the thrust bar (4) and to which there is securely attached a circular member with knurled hand grip for use in rotating the spring-winding key.

Item (3) is a connecting sleeve securely attached by set screws to the chart-drive shaft and the drive shaft of the expansion coupling (6).

Item (4) protects the chart-drive mechanism against vertical thrust by the expansion coupling. Each end of this thrust bar is supported by the middle rod of the three vertical support rods at each side of the mechanism and between nuts by which the thrust bar (4) can be adjusted to place it in correct alignment with the drive shafts.

Item (5) is a ball thrust-bearing which reduces friction between the thrust bar and expansion coupling.

Item (6) is an expansion coupling constructed of a section of chart-drive clock spring. The purpose of this expansion coupling is to provide a flexible connection between the extended drive shaft attached to the chart-drive shaft and the adjusting clutch composed of items (7) to (10), inclusive, through which the gas-pressure regulator screw (14) is driven. This expansion coupling is necessary for both rotary and vertical movement of the regulator-adjusting screw during adjustment and operation of the mechanism.

The adjustable clutch designed to provide a simple mechanical means for disconnecting the chart-drive shaft and the attached expansion coupling from the regulator adjusting screw so that the regulator screw can be manually rotated to a selected starting position and then reconnected to the expansion coupling. The clutch consists of a driven member (7) attached to the lower mounting lug of the expansion coupling and around which two friction plates (8) and (9) are free to rotate when the machine bolt (10), which is threaded into the friction plate (8), is loosened to cause a small clearance between the contacting surfaces of (7), (8), and (9). Since friction plate (9) is securely attached to the regulator adjusting screw (14), the screw can be adjusted to the desired starting position by the manual rotation of the friction plates after which the clutch can be engaged by tightening the machine bolt.

The assembly consisting of items (12), (13), and (15) is a device for indicating the relation between the position of the adjusting screw of a Moore Nullmatic gas-pressure regulator (16).

The indicator is actuated by a cam (12) which is securely attached to the adjusting screw of the gas-pressure regulator so that it rotates and moves vertically with the screw and maintains contact with a cam rider attached to an indicating pointer (13) which is thus caused to move along the scale (15).

Provision for setting the regulator adjusting screw for 24-hour delayed action is generally advisable since at the start of the sampling procedure the sample vessel will contain a sample of the source gas at atmospheric pressure; should this pressure be increased by the sampling mechanism over the first 24-hour period, the total volume of gas collected in that period would not be comparable to that admitted to the container by the sampling mechanism during each of the succeeding 24-hour periods. Therefore, it seems practical to use the 24-hour delayed action setting which results in the use of a "spot" sample of the source gas for the first 24-hour sampling period.

The Moore Nullmatic gas-pressure regulator has a pressure range of 0 to 100 psig. and regulator-purge connections (17) and (18). This regulator is supported with two adjustable clamps by which the regulator inlet and outlet pipes are attached to two adjustable horizontal rods extending between the middle rods of the three vertical support rods at each side of the mechanism.

Although pressure range of the regulator (0 to 100 psig.) was selected as the most satisfactory for field tests, almost any desired range of operating pressure and rate of flow can be obtained by changing the pitch of the regulator adjusting screw and/or the use of different springs.

The special equipment discussed above, together with a pressure gage (Fig. 2) for indicating the pressure of the gas within the gas-sample container, is secured to a metal base and housed in a metal case so constructed that the assembly is protected against damage from surrounding conditions and in such a manner that all operating parts can be adjusted without removing the equipment from the case. All gas conduits within the case are constructed of ¼-in. copper tubing each connected by a union coupling to a nipple extending through the side of the case and welded thereto.

Operating Procedure

With equipment assembled as shown in Fig. 2, the high-pressure, gas-pressure regulator adjusted to deliver gas at 100 psig., the high-pressure valve on sample source open, all other valves closed, the sample line disconnected from the gas-sample inlet valve, and the line for purging connected to the purge-gas inlet valve of the sample container, proceed as follows:

1. Open purge-gas inlet valve and allow the pressure within the sample container to increase to the set operating pressure of the high-pressure, gas-pressure regulator.
2. Close the purge-gas inlet valve and open the gas-sample inlet valve to allow the pressure within the container to decrease to a point of no flow; then close the gas-sample inlet valve.
3. Repeat 1 and 2 steps to fill and empty the sample container at least four times (for 100-psig. gas pressure) and thus complete the purging of the gas-sample container.
4. Close the purge-line valve and disconnect the purge line from the purge-gas inlet valve.
5. Release the regulator adjusting clutch by turning the machine screw approximately one turn.
6. Manually rotate the clutch until the pointer indicates one day and zero pressure on the scale.
7. Open the gas-sample line, shut-off valve; then rotate the clutch counterclockwise until there is a small flow of gas through the gas-sample line.
8. Connect the gas-sample line to the gas-sample inlet valve of the container.
9. Again rotate the released adjusting clutch counterclockwise until the gas pressure within the container, as indicated by the gas pressure gage, is about 50 psig.
10. Inspect all fittings for gas leakage using the soap-bubble test and make any necessary adjustments to eliminate gas leakage from the gas-sample container and connecting piping.
11. Close the gas-sample, shut-off valve; open the purge-gas inlet valve to reduce the pressure within the system to 0 psig.; then immediately close the purge-gas inlet valve.
12. Again rotate the released adjusting clutch clockwise to adjust the indicating pointer to indicate 1 day and 0 psig.
13. Open the gas-sample line, shut-off valve. The indicating pressure gage should then indicate 0 psig.
14. Again rotate the released adjusting clutch clockwise until the pointer indicates 0 days and 0 psig.
15. Engage and lock the adjusting clutch by tightening the machine screw, being careful not to change its setting from that determined by following step 14.
16. Completely wind the spring of the chart drive by rotating the knurled hand wheel.

On completion of the operations specified in steps 1 to 16, the sampling mechanism is properly adjusted to start mechanical sampling at the completion of one revolution of the regulator screw by the chart drive which requires 24 hours.

Field Tests and Experiments

The gas-sampling mechanism described here has been in continuous operation at a gas-sampling location in Southern California Gas Co.'s Kern Operating Division from November 1950 to date. At this particular sampling location the ambient temperature has, at times, increased rapidly from a low at dawn to a high at noon and has varied as much as 53° F. With the sample container unprotected from the effects of ambient temperature, the contained gas has reached a pressure equal to that controlled by the regulator and consequently there

(Continued on page 118)

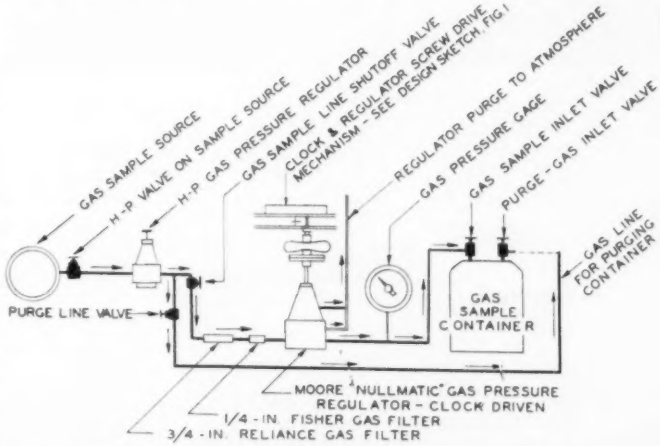
GAS SAMPLE SOURCE
H-P VALVE ON SAMPLE SOURCE
H-P GAS PRESSURE REGULATOR
GAS SAMPLE LINE SHUTOFF VALVE
CLOCK & REGULATOR SCREW DRIVE MECHANISM - SEE DESIGN SKETCH, FIG. 1
REGULATOR PURGE TO ATMOSPHERE
GAS PRESSURE GAGE
GAS SAMPLE INLET VALVE
PURGE-GAS INLET VALVE
GAS LINE FOR PURGING CONTAINER
PURGE LINE VALVE
GAS SAMPLE CONTAINER
MOORE "NULLMATIC" GAS PRESSURE REGULATOR - CLOCK DRIVEN
1/4-IN. FISHER GAS FILTER
3/4-IN. RELIANCE GAS FILTER

Fig. 2—Arrangement of piping and gas-control apparatus used in sampling gas by clock driven regulator.

Chemical Treating Plant For Refinery Waste Water

by H. Schindler

THE petroleum industry has long been aware of its responsibility for proper disposal of its process waste waters. Long before interest in the abatement of stream pollution became as general as it is now, it had studied and solved its foremost problem, viz., removal of entrained oil from refinery waste waters. The work along this line, sponsored by the American Petroleum Institute, has been so successful that in many states the authorities in charge of stream-pollution control specify the A.P.I. separator for the removal of oil from refinery waste water, and do not permit any deviation from this design.

With the greater emphasis on chemical processing in the petroleum industry, the problems of waste-water disposal have changed in character, and special treating methods have had to be devised for those effluents which are not merely suspensions of oil in water, but which contain chemicals in solution.

In the refinery of the Daugherty Refinery Division of L. Sonneborn Sons, Inc., all of those waste waters which contain water-soluble contaminants are treated together. The waste water which contains only suspended oil is kept completely separate, and is very successfully treated in an A.P.I. separator.

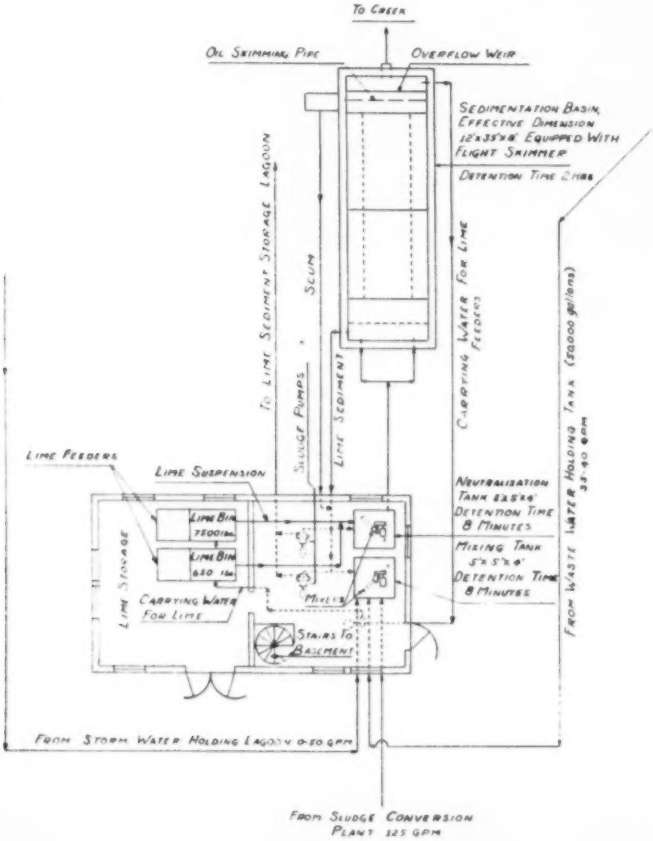
To Creek
Oil Skimming Pipe
Overflow Weir
Sedimentation Basin, Effective Dimension 12'x35'x8' Equipped With Flight Skimmer
Detention Time 2 Hrs
To Lime Sediment Storage Lagoon
Scum
Sludge Pumps
Lime Sediment
Carrying Water For Lime Feeders
From Waste Water Holding Tank (28,000 gal/hrs) 35-40 GPM
Lime Feeders
Lime Suspension
Lime Bin 2500 lbs
Lime Bin 650 lbs
Lime Storage
Carrying Water For Lime
Mixer
Stairs To Basement
Neutralisation Tank 8'x8'x9' Detention Time 8 Minutes
Mixing Tank 5'x5'x9' Detention Time 8 Minutes
From Storm Water Holding Lagoon 0-50 GPM
From Sludge Conversion Plant 125 GPM

Fig. 1

Source of Waste Water

At the Daugherty refinery acid sludge does not represent a source of pollution because the sludge is converted into sulfuric acid and coke. This is accomplished by decomposing the sludge into sulfur dioxide and coke, followed by oxidation of sulfur dioxide to sulfuric acid in a conventional contact acid plant. The gas produced in the decomposition step is cooled by direct contact with water, and this cooling water is continuously discharged from the unit. It cannot be directly admitted into the stream because it contains a certain amount of dissolved sulfur dioxide, and has an acidity corresponding to 0.1 to 0.2 per cent sulfuric acid. The volume of this cooling water from the sludge-conversion plant is such that it represents the largest component of the waste waters requiring chemical treatment.

The other source of waste water containing dissolved chemicals is represented by the white-oil plant. Whereas the bulk of the water-soluble sulfonates occurs in the acid sludge

THE AUTHOR

Hans Schindler, with L. Sonneborn Sons, Inc., is a native of Vienna and received his technical education at Institutes of Technology of Munich and Berlin, as well as University of Prague, which granted him the degree of doctor of science in 1934. Joining Sonneborn in 1946, he has been located since at the firm's Daugherty refinery at Petrolia, Pa. Schindler formerly worked for Oelwerke Julius Schindler, Hamburg, one of the largest German white-oil manufacturers. He came to the United States in 1938 to join Pure Oil Co. in its research and development laboratories. He served as a member of the technical oil mission investigating the petroleum and synthetic-oil industry in 1945.

The accompanying paper was presented at the sixteenth midyear meeting of American Petroleum Institute's Division of Refining at Tulsa, April 30-May 3.

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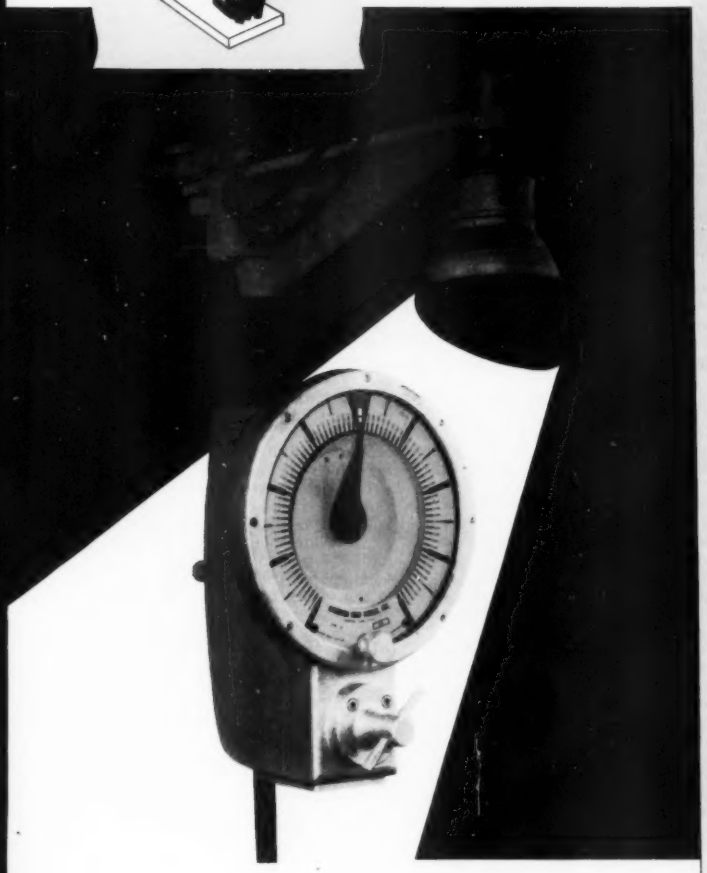

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- ☐ 2. The water effluent from the treating plant is free from oil.
- ☐ 3. Color of the effluent represents a reduction by at least 98 per cent of the original color of the process water.
- ☐ 4. The plant is economically run, utilizing full time operator during only one shift each day.

and presents no disposal problem, the waste water from the manufacture of white oils and from the recovery and purification of petroleum sulfonates cannot be kept completely free from these compounds because of unavoidable spills and because of the need for periodic cleaning of equipment as well as for operational reasons.

The process waste water, therefore, is colored, acidic, or alkaline, and it contains water-soluble sulfonic acids and sometimes emulsified oil.

Waste-Water Treating Process

The two types of waste water requiring chemical treatment produced at the Daugherty refinery are: (1) water containing sulfur dioxide which originates at the sludge-conversion plant; and (2) acidic or alkaline process waste water containing water-soluble petroleum sulfonates which originate at the white-oil and petroleum sulfonate plants.

After extensive laboratory and pilot-plant work, a procedure was developed which combines the disposal of both wastes in a simple and economical way. The procedure is based on the finding that the process waste water can be decolorized by converting the water-soluble sulfonates into the insoluble calcium salts, and that this reaction can only be successfully completed if the free sulfonic acids, rather than the corresponding salts, are reacted with lime. On this basis the following method was found most advantageous, because it combines the chemical requirements of the process-water disposal with the purification of the sludge-conversion plant waste water:

1. Adjustment of process waste water to a pH of 5 by mixing with acidic water from sludge-conversion plant.

2. Precipitation of sulfonic acids and mineral acid with hydrated lime at a pH of 7.0 to 8.4.

3. Continuous settling of precipitate and discharge of treated water.

The small-scale results with this procedure were so encouraging that it was decided to use it full scale.

Collecting and Treating

Waste water originating in the white-oil manufacturing process is conducted through tile sewers which have been made tight with acidproof cement, to a concrete sump of about 3,750-gal. capacity, from where it is pumped through a 4-in. line to a 50,000-gal.-waste-water holding tank located near the treating plant. The sump is equipped with a vertical centrifugal-type bronze-fitted 200-g.p.m. sump pump, and, for emergencies, a steam pump of about the same capacity.

Waste water from the purification of petroleum sulfonates is collected in a sump which holds about 2,000 gal., and is pumped into the same waste-water holding tank as the white-oil process waste water. The same line is also used for both waste waters. The volume of the combined waste amounts to an average of 50,000 gal. per day.

The unpredictable change of alkalinity, acidity, oil content, salt concentration, etc.—aggravated by occasional elevated temperatures and the presence of abrasive material, such as clay—makes selection of an adequate piping material very difficult. Bronze has given satisfactory service in pumps and valves.

Although it is attempted to collect process waste water at its source and thereby keep to a minimum the volume of water requiring chemical treatment, it is not possible to eliminate spills completely or to avoid contact of storm water with areas impregnated with sludge and similar wastes. For this reason a certain amount of storm water had to be included in the waste-water collecting system. This water is collected in a sump equipped with two vertical centrifugal sewage pumps, with a capacity of 1,400 g.p.m. each, and is pumped through a 16-in. standard cast-iron line to a holding basin with a capacity of about 550,000 gal. The accumulated storm water is treated together with the other waste waters.

The acidic waste water from the sludge-conversion plant—which amounts to 180,000 gal. per day of acidic water with a temperature of 180° F.—is run by gravity through 4-in. rubber-lined steel pipe directly to the treating plant. In this way all unnecessary handling of this very corrosive water is avoided. The properties of the waste waters and their volume are summarized in Table 1.

As pointed out previously, treatment of the waste water consists in mixing the acidic waste water with the process waste water containing water-soluble sulfonates so that these are converted into the sulfonic acids in case the process water is alkaline. The acidic mixture is then treated

(Continued on page 114)

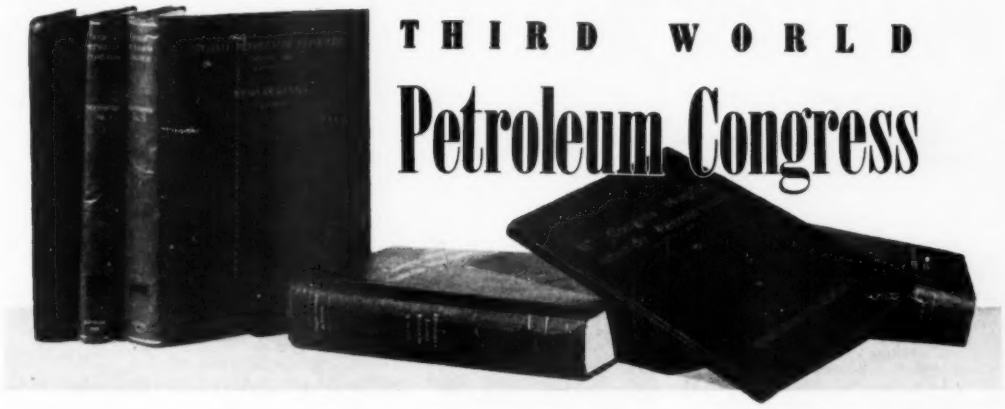
TABLE 1—PROPERTIES AND VOLUME OF WASTE WATER

Source—	Temperature (°F.)	Properties	Volume (gal. per day)	Feed rate to treating plant (g.p.m.)
Process water from white-oil and petroleum-sulfonate plant	60 to 150	Alkaline or acidic; contains salts, water-soluble sulfonates, and emulsified oil	18,000 to 40,000	35
Water from direct cooling of gases from sludge-conversion plant	180	Acidic (dissolved sulfur dioxide equivalent to 0.1 to 0.2 per cent sulfuric acid)	180,000	125
Storm water	60 to 80	Slightly acidic		40 (maximum)

TABLE 2—OPERATING DATA OF WASTE-WATER TREATING PLANT

Month (1950)—	Frequency of acidic reaction (days)	Average acidity (P.p.m. of sulfuric acid)	Frequency of alkaline reaction (days)	Alkalinity (P.p.m. of sodium hydroxide)	Composite sample (p.p.m.) Color	Composite sample (p.p.m.) Oxygen consumed	Water treated Process waste water (gal.)	Water treated Total waste water (gal.)	Acidity of mixed waste water (p.p.m. of sulfuric acid)	Lime used (tons)	pH	Properties of effluent (p.p.m.) Color	Properties of effluent (p.p.m.) Oxygen consumed
June	16	983	14	1,950	1,700	518	1,678,264	7,413,264	1,360	55.3	7.5	30	42
July	16	2,180	15	1,275	5,100	760	1,718,496	7,551,496	1,600	54.1	7.0	45	50
August	19	785	12	440	2,150	460	1,505,796	7,305,796	1,325	50.4	7.0	45	37
September	23	1,365	7	314	5,000	545	1,396,400	7,113,384	1,435	54.7	7.0	60	35
October	17	674	14	515	3,160	535	1,387,540	7,027,540	1,330	52.3	7.0	65	40
November	16	586	14	1,010	2,600	623	1,380,040	7,220,040	1,150	44.5	7.0	50	40

DIGESTS OF TECHNICAL PROCEEDINGS . . .



THIRD WORLD Petroleum Congress

Here is the first of two technical reports covering engineering papers at the Third World Petroleum Congress, held at The Hague, the Netherlands, May 28-June 6. The second report will appear in next week's issue. In attendance for the Journal at this important oil meeting are Kenneth B. Barnes, managing editor, and W. L. Nelson, technical editor.

Section 1: Geology and Geophysics

Contributions of Bacteria To the Origin of Oil

CLAUDE E. ZOBELL, Scripps Institution of Oceanography, La Jolla, Calif.

BY virtue of their rapid rate of reproduction, their ecological versatility, and their ability to catalyze so many organic and inorganic reactions, bacteria are well adapted to affect conditions in recent marine sediments. There is accumulating evidence to suggest that bacteria may also be active in older sediments containing oil, water, and minerals essential for the growth of bacteria.

Assuming that organic matter is the mother substance of petroleum, it is almost axiomatic that bacteria have contributed to the origin of oil, because all types of organic matter are susceptible to bacterial modification. Under anaerobic conditions bacteria tend to decompose organic matter resulting in residues that continue to become relatively richer in carbon or hydrogen and consequently more petroleum-like in chemical composition.

Methane and lesser quantities of other hydrocarbons are produced by bacteria.

Bacteria may also contribute to the origin of oil by catalyzing the hydrogenation of certain compounds.

Aerobic bacteria which oxidize petroleum hydrocarbons may prevent the accumulation of oil in certain environments; araerobes may modify it at the oil-water interface.

There are several mechanisms by which bacteria may release oil from oil-bearing materials and promote its migration and accumulation.

Although there may be many ways in which bacteria contribute to the origin of oil, their action is not mutually exclusive. Chemical, physicochemical, and geological processes must also play important parts. Further investigations designed to appraise bacterial activities may provide important clues to what constitutes a source bed of petroleum, not to mention possible applications to practical problems in petroleum technology.

Un Gisement dans les Schistes Fractures du Socle L'Oued Beth (Maroc Francais)

LA SOCIETE CHERIFIENNE DES PETROLES.

AN unusual type of oil accumulation occurs in Morocco, in which the oil underwater drive has accumulated in certain blocks along the border of the Paleozoic basement, in the immediate vicinity of the external margin of the pre-Rif Mesozoic basin.

The nature of the reservoir, viz., a steeply dipping fractured series of metamorphic paleozoic rocks, mainly chloritic sandstones and slates, and the method of accumulation place Oued Beth fields in the same group as certain fields of the "basement complex" of California, particularly that of Edison (Kern County).

Seismic Surveys Over Asymmetrical Structures In Southwest Iran

D. T. GERMAIN-JONES, Anglo-Iranian Oil Co., Ltd., Newark, Notts., England.

A DESCRIPTION is given of the type of structures which form the targets of seismic work in Southwest Iran. The difficulties encountered in their location and definition are considered, and brief details of the refraction technique developed for this large-scale problem are given. A need has arisen for more accurate delineation of these structures, particularly of the steeper flanks, and this has led to an examination of the possibility of improving the interpretation technique. Examples of the results obtained over theoretical structures are given.

Seismic work in the plains area has shown marked discrepancies between the results or refraction and reflection surveys in the definition of the axes. Tentative explanations for these discrepancies are submitted.

Geology and Petroleum Occurrences in the Middle East

F. R. S. HENSON, Iraq Petroleum Co. and associated companies.

CHARACTERISTIC sediments, typical fossils, and diastrophic episodes are summarized for given sectors in a series of tables. In pro-Neogene sections, calcareous rocks with some evaporites predominate throughout, and terrigenous clastics are confined to the shelves around basement highs, and to temporary troughs in the immediate vicinity of land ridges and islands.

Stratigraphic breaks due to epeirogenetic and taphrogenetic movements are numerous, but visible angular unconformities are exceptional before the Neogene when the present morpho-tectonic pattern of the region was developed by Wallachian-Attic orogeny.

The formation, primary migration, and primary accumulation of oil in the Middle East must have been conditioned by the preorogenetic history of the Unstable shelf (stille); and that accumulation of oil in anticlines of Neogene origin must have been secondary, and largely confined to areas of earlier, primary accumulation. The study of pre-Neogene conditions is, therefore, fundamental in the search for oil in this region.

Agha Jari Oil Field, Southwest Iran

D. C. JON, S. ELDER, and A. E. PEDDER, Anglo-Iranian Oil Co., Ltd., Masjid-i-Sulaiman, Iran.

A DESCRIPTION of the exploration and development of Agha Jari oil field. Certain metamorphic effects caused by the burning of gas escaping along the Lower Fars thrust front are described, also the occurrence of condensate oil and high-pressure water shows in the rocks overlying the main reservoir.

Agha Jari 1 was located 1 mile northeast of the surface axis as this was considered

sufficient to take care of the normal axial hade of the asymmetric fold. The well spudded in on November 6, 1926, with a cable-tool outfit which was later changed to a rotary outfit. Evidence from cores, however, that the well had passed through a fault led to the abandonment of the well on March 4, 1930.

Further geological work suggested that the folding of the surface beds and the underlying Asmari limestone was strongly disharmonic and Agha Jari 2 was sited 3½ miles almost due north of Agha Jari 1 and spudded in in 1936. Gas was found in the Asmari limestone and Agha Jari 2 became the discovery well. Agha Jari 3 was located 1¼ miles farther to the northeast and reached the Asmari limestone in the oil column of the northeast flank.

During the drilling phase from 1943 to October 6, 1950, a total of 139,419 ft. has been drilled, making a total of 191,346 ft. drilled since 1926. With this footage 18 potential producers have been found, with 1 more awaiting repair, 4 wells being drilled, and 4 wells abandoned.

Les Reflections a l'Interieur des Domes de sel et Leur Importance Pour les Recherches de Petrole

TH. KEY and B. HELWICH, Geophysicien a la Societe Seismos-Hannover.

EXAMPLES are given from surveys of salt domes in Germany, in which the paths of reflected events have certainly passed through the salt core. The reflector may be the interior of the lateral or overhanging face of the dome, or the contact between two different Permian horizons both containing salt layers which constitute the dome. Determination of the position of the reflector depends mainly upon the dip of the upper surface of the salt, at which the energy is refracted.

Interpretation Quantitative des Mesures en Prospection par Courants Telluriques

V. BARANOV, Compagnie Generale de Geophysique.

QUANTITATIVE interpretation in prospecting by the telluric method consists of searching the current lines in the soil while knowing the density of current measured at the surface. The cylindrical or two-dimensional-case problem can be resolved quite easily by a mathematical apparatus which seems no more complicated than that which is necessary in classical prospecting methods. Thus the telluric method, at first purely empirical, is provided with a more secure mathematical basis.

Conditions Favoring Preservation of Chlorophyll In Marine Sediments

MARGARETHA BRONGERSMA-SANDERS, Leiden University, Netherlands.

HYPERTROPHIC conditions in the sea probably are the main cause for the origin of oil, and of far more importance than persistent stagnation. In eutrophic waters the production of plankton and benthos both are great; there is a direct relation between the production of plankton and benthos. Above a certain maximum the relation is indirect: the greater the plankton production the scarcer the benthos production. Such conditions are called hypertrophic.

If the plankton production is very high, the benthos is nearly wholly absent. As a result of the abnormally high plankton production the oxygen content of the bottom water during part of the year becomes zero and H_2S is developing. Such conditions exist in rather shallow parts of the sea, where there is no strong stagnation whatever.

Distinctive features of hypertrophic conditions are: a frequent occurrence of thick waterbloom (particularly of red water) and of mass mortality of invertebrates and vertebrates. Hypertrophic conditions occur in the first place in regions of upwelling; they do not occur in all regions of upwelling, but only in those where the upwelling is very tense. In the second place such conditions occur in certain inland seas where nutrients accumulate.

Head office of N. V. De Bataafsche Petroleum Maatschappij (Royal Dutch-Shell Group) at The Hague.

Applied Geophysics in West Germany During Last 5 Years

HANS CLOSS, Amt fur Bodenforschung, Hannover, Germany.

GENERAL data are given as to the recent development of the reflection seismic method. The relatively simple instruments of the first stage of development led to new types fitted out with two simultaneously acting gain controls together with an increase in the number of traces. Due to the improvement of the equipment the field technique experienced many a valuable modification by which new areas were opened up for the reflection seismic method. Some examples are given of modern surveys in the Northwest German salt-stock area and some general conclusions drawn from the results. The conditions in the Emsland and in the foreland of the German Mittelgebirge, the youngest oil field area of North Germany, are outlined with respect to reflection seismic work. For the refraction seismic method particularly, experiences with blasting in deep bore holes are dealt with. Concerning gravimetry and magnetics, recent experiences and ideas on regional anomalies are given.

Genesis of Oil Deposits in Emsland Area (Germany)

H. LOEGTERS, Amt. fur Bodenforschung, Hannover, Germany.

THE geological development of Emsland oil fields, as well as the chemical properties of their crudes, lead to the conclusion that the oils originate from a uniform source. The crudes of one type of field differs from another in chemical respect. The various types of oil bear a clear relationship to the geological development of the corresponding pool. There are:

1. "Primary oil" in the Portland and Wealden source beds of the basin (e.g., Quakenbrueck).

2. Oil in marginal deposits of Wealden and Valanginian. This oil has migrated from the source beds of the basin into the reservoirs which were trapped underneath the Albian transgression (e.g., Dalum).

3. "Secondary oil" which has left these marginal positions in order to migrate again. The oil accumulated a second time in new structural highs on anticlines which were folded at the end of the Cretaceous (e.g., Georgsdorf).

The chemical character of the various types relates to the distance of migration, that is: the farther the migration from source bed to reservoir, the greater the chemical alteration of oil.

Oil Possibilities of Turkey With Special Reference To Raman Field

CEVAT TASMAN and NECDET EGERAN, Geological Society of Turkey (M.T.A.).

THE oil possibilities in four different areas of Turkey are considered. The principal petroliferous region is indicated in the southeastern part of the country where the Ramandag structure has already proved itself of commercial value. The possibilities of the Alexandretta Gulf basin, northeastern Turkey, and Thrace in European Turkey, are briefly noted.

A detailed discussion of the Raman oil field is given.

Radioactivity and the Origin of Petroleum

IRVING A. BREGER and WALTER L. WHITEHEAD, Massachusetts Institute of Technology.

SINCE 1942 American Petroleum Institute has sponsored at the Massachusetts Institute of Technology a project to investigate the effect of radioactivity on the transformation of marine organic materials into petroleum hydrocarbons. To date it has been possible to (1) convert fatty

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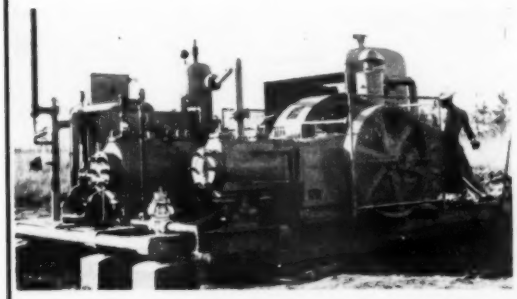

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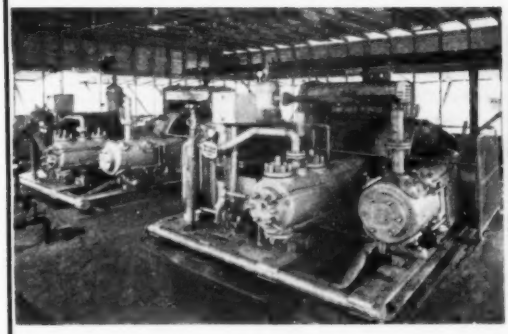

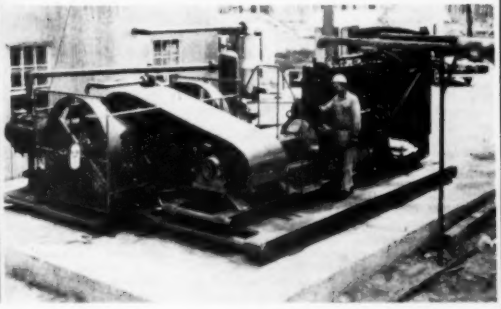

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acids into aliphatic hydrocarbons, (2) to convert a naphthenic acid into a cyclic hydrocarbon by means of alpha-particle bombardment, and (3) to produce gaseous hydrocarbons found in association with crude oils. Work is being carried out to determine the relationship between the organic matter and radioactive elements in marine organic shales. Studies have also been carried out to establish the radioactivity of a number of important geological strata associated with crude oils. The following important results can be stated:

1. Bombardment of fatty acids with alpha particles leads to the production of aliphatic hydrocarbons which are found in petroleum.

2. Bombardment of a naphthenic acid leads to the formation of a naphthenic hydrocarbon which is found in crude oil.

3. Unsaturated compounds which are bombarded may be hydrogenated during the course of the reactions. This process may remove part of all of the hydrogen produced during reactions initiated by radioactivity or bacteria.

4. Bombardment of almost any organic compound results in the formation of gaseous hydrocarbons found in association with crude oils.

5. Progress has been made on the determination of the association of radioactive elements and organic matter in marine organic shales.

6. Detailed measurements have been made of the radioactivity of a number of important formations associated with petroleum.

Les Possibilities Petrolifères de la Sicile et de la Zone Adriatique de la Maiella (Apennin Central) Dans le Cadre de la Tectonique Generale de l'Italie

ENZO BENEO, Geologique d'Italie, Rome.

ITALY and Sicily are broadly composed of two tectonic units, viz., an allochthon, composed of the plastic Argille Scagloise, and a rigid autochthon, which, in the two regions dealt with in this paper, is dominantly calcareous and ranges in age from Cretaceous to Miocene.

In the autochthonous areas of Ragusa, and the eastern flank of the Monte Maiella two rich asphaltic deposits are exploited and the author believes that beneath the allochthonous cover elsewhere, promising oil deposits should be preserved.

Section 2: Drilling and Production

Internal Hydrostatic Pressure Testing as a Measure of the Performance Values of Oil Well Casing and Tubing

H. G. TEXTER, Spang-Chalfant (National Supply Co.)

THIS paper argues that the mandatory requirements of American Petroleum Institute casing and tubing specifications do not insure that these products will withstand the forces to which they will be subjected. Resistance to these forces, i.e., tension, collapse, and bursting, are expressed as performance values as published by the A.P.I. in Bulletin 5C2: "Performance Properties of Casing and Tubing."

After a discussion of the specifications it is pointed out that compliance with them only indirectly proves the worth of the product. Only, one, the Mill - Inspection Hydrostatic Test, is a direct proof of quality, and it does not go far enough.

Exception is taken to the description of "injurious defects," pointing out that strict adherence thereto does not insure against failure but leads to discarding good product. Data and photographic records are offered on this point.

To avoid arguments on "injurious defects," and to insure proper performance, it is concluded that proof testing of each length is logical. Since tension testing, and especially collapse testing, would be too slow and expensive, internal pressure testing to 80 per cent of the minimum yield strength is recommended.

The A.P.I. has set up "alternative" (not mandatory) high-pressure test figures, and it is argued that pipe which withstands these pressures would not fail under comparable tension and collapse tests.

A Drillability Classification Of Geological Formations

A. L. HEAD, JR., Reed Roller Bit Co., Houston

BECAUSE of the need in the oil-well-drilling industry for a system by which different types of bits can be classified with respect to different types of geological formations, this paper has been written.

Herein, a classification of geological formations based entirely upon the relative efficiency at which these formations can be drilled with a small rolling-cutter-type test bit has been established. This classification has been shown to be consistent with actual field drilling practices.

A method of classifying different types of actual bits with respect to the classified formations has been illustrated. This method provides a means of determining a sphere of application for each type of bit; that is, the formations which each type drills most economically with respect to all other types can be determined. This means that most of the guesswork concerning the selection of a bit for a particular formation can be eliminated.

Theoretical Considerations Involved in the Determination of Petroleum Reservoir Parameters From Electric Log Data

M. R. J. WYLLIE, Gulf Research & Development Co., Pittsburgh

RECENT research work on the subject is reviewed and extended. The formation parameters that may be calculated are Interstitial-water salinity, connate-water saturation, porosity, and permeability. It is shown that the calculation of interstitial-water salinity from the electrochemical component of the S.P. curve appears to be theoretically justifiable, particularly when logs show a consistent shale-base line. The optimum theoretical conditions for such calculations are outlined.

The calculation of accurate formation factors from log data is shown to be theoretically impossible since oil sands are never completely flushed by invading-mud filtrate. Nevertheless, it should be possible adequately to correct the apparent formation factors from log data and to use the average value so obtained in a formula relating resistivity index to a power function of connate-water saturation. If the appropriate power function is known, it is shown the average connate-water saturation computed from log data should agree closely with the average saturation found by conventional core analysis.

The calculation of average formation porosity from log data is shown to be contingent upon the availability of some core-analysis information.

The use of electric log data to compute average formation permeability is also discussed.

Oil-Base Drilling Fluids

GEORGE MILLER, Oil Base, Inc., Compton, Calif.

THE use of oil-base mud is still relatively new to the oil industry, although the theory connected with its use has been known for almost 20 years. Oil-base muds differ from each other as do water-base muds, and in order to obtain maximum results, certain desirable properties are essential. In general, a good oil-base drilling fluid is a synthetic mud which has most all the properties, and some qualities not possessed by water-base mud, plus the added advantages of not allowing the producing formation to become water blocked or mudded off. The use of oil-base mud is highly important to obtaining accurate core analysis and computation of reservoir information.

Results obtained during the past 10 years show the usage of desirable oil-base muds in some cases is the difference between a dry hole and a substantial producer. The majority of cases prove that use of a good oil-base drilling fluid in drilling the pay zone results in a higher initial well production and over a period of years the production comparison is even more amazing—sometimes amounting to a net difference to the well owner of several hundred thousand dollars per well.

Standards for Casing Centralizer Tests

W. S. ALTHOUSE, JR., and E. H. CLARK, JR., Baker Oil Tools, Inc., Los Angeles

THIS paper indicates that there is a definite need for establishing standard tests for casing centralizers in order to obtain the correct information for proper spacing to insure a satisfactory primary cement job. Standard tests for casing centralizers would also provide the operator with a uniform basis for comparing centralizers of various manufacturers. The paper describes (1) the purpose and types of tests, (2) the equipment used to perform these tests, (3) the centralizers to be tested, (4) the test procedure, and (5) the evaluation of test results.

The paper points out that there are many factors to be determined in choosing the proper centralizer for any particular job and that the only way to determine these factors accurately is to make surface tests that reproduce as closely as possible the severe conditions under which the casing centralizer must perform both while it is being run in the hole and while the casing is being cemented.

Displacement of Oil by Water from Packs of Granular Material

W. F. ENGELBERTS and L. J. KLINKENBERG, Royal Dutch-Shell Laboratories, Amsterdam

THE displacement of oil by water from porous formations has been studied for the simple case of packs of unconsolidated material made up of grains of nearly uniform size. From the results discussed it can be concluded that:

1. It is not to be expected that changes in the capillary forces will substantially effect water-drive processes under field conditions.

2. The higher the viscosity of the oil, the more a low rate of displacement is ef-

fective in reducing the amount of water produced with the oil. For oils with viscosities less than about 30 c.p., the rate of displacement will probably not affect the ultimate economically recoverable.

3. The influences of the viscosity ratio and the rate of displacement are connected with the instability of the transition zone between oil and water, resulting in a "fingering" phenomenon.

4. Laboratory experiments such as flood pot tests can be useful to provide information on residual oil in the flooded-out portion of the field if the sand contains connate water or is otherwise hydrophilic. It is recommended to conduct these tests at the highest possible rates.

Drilling and Producing Oil and Gas in the Gulf of Mexico

LEIGH S. McCASLIN, JR., Gulf Coast District Editor, The Oil and Gas Journal

THE current search for new oil reserves in the Continental Shelf area of the Gulf of Mexico involves many unique engineering and operating problems. The scope of the search is indicated by the estimated $200,000,000 which have been spent thus far.

Drilling methods utilized to date include such new developments as the floating tender-platform combination, the completely self-contained drilling platform, and the "stabilized sea drill." Producing methods have centered around the two major problems of (1) finding a place to put well-site equipment, and (2) developing an economical method of transporting the produced oil and gas to shore.

Many drilling and producing problems remain and new ones are constantly arising as further development takes place. The use of especially-designed craft for offshore oil operations will be a thing of the future. To date, most operators have been utilizing war-surplus craft because of availability and cost. As these are in need of replacement and the supply of surplus craft is exhausted, the marine engineer and the naval architect will be called in to provide "tailormade" boats. This should result in cheaper operating costs and safer operating conditions.

Thought is now being given to installation of completely automatic equipment to handle the production of offshore wells.

There are many engineering problems remaining in the field of offshore development. Basically, these problems are all cheaper ways of drilling for and producing oil. Tremendous progress has been made in the few brief years since the war. There need be no doubt concerning the future.

Diesel Electric Drilling

HOWARD L. SHATTO, Shell Oil Co., New Orleans.

THE cost of a rig, using electric transmission, should be equivalent to that of one with mechanical transmission, and throughout this paper the many points of operational superiority of the electric transmission are brought to light. Rotary-equipment suppliers now have plans on their drawing boards for enhancing the performance of mechanical transmissions by the addition of scoop couplings or hydraulic torque converters, etc., and these additions are being brought to the market as rapidly as they are accepted by the industry. But each of these additions adds to the cost, weight, maintenance, and control complexity and detract from the efficiency of the rig. They are all aimed at achieving one feature or another of the excellent transmission characteristics already available in the Ward-Leonard transmission.

The major obstacle to the acceptance of electric transmissions for drilling equipment is the difficulty encountered in coordinating the rig-equipment manufacturer with the electrical-equipment manufacturer to secure a well integrated unit leading to standard packaged designs. If this difficulty can be overcome there is no reason that the Ward-Leonard transmission should be less popular in drilling equipment than it has become in locomotives.

Pressure Build-Up in Wells

D. R. HORNER, N. V. De Bataafsche Petroleum Maatschappij, The Hague.

THE report presents a method of analysis of the pressure build-up curve obtained from a closed-in well by plotting the bottom-hole pressure against the logarithm of $\frac{t_o + \theta}{\theta}$, where θ is the closed-in time and t_o is the past producing life of the well.

In all cases it proves to be possible to determine the permeability of the formation from the slope of this curve.

Methods are also given for extrapolating the recorded pressures to infinite closed-in time for the cases of:

1. A new well far from any reservoir boundary.
2. A new well close to a fault, but far from any other boundary.
3. A well in a finite reservoir.

Crude-Oil Dehydration: A Universal Size Frequency Distribution Law for Emulsion Particles

N. SCHWARZ, Royal Dutch-Shell Laboratories, Amsterdam.

FOLLOWING a short introduction on the breaking of crude-oil emulsions, it is argued that a fundamental investigation into this problem should be based on the kinetics of emulsions. In this respect the particle-size frequency analysis is the first subject that must be dealt with.

A study of experimental material from the literature that appeared between 1920-40 makes it plausible that the particle-size distribution of all stable emulsions can be represented by one single function containing only one parameter. In this paper such a universal distribution law, derived statistically, is introduced, the parameter being six times the reciprocal specific surface. Verification with published experimental data on several O/W emulsions yielded very good agreement for stable, mechanically prepared emulsions.

Experiments are described in which the distribution law was tested on crude-oil emulsions with satisfactory results. Some applications in the field of crude-oil dehydration are discussed and others are mentioned.

Determination de la Permeabilite Des Roches a Partir de la Pression De Deplacement d'un Fluide Homogene par un Autre

A. HOUPEURT, Institut Francais du Petrole; and G. MANASTERSKI, Ecole Nat. Sup. du Petrole.

COMPARATIVE measurements of porosity and permeability made by many authors on numerous samples of rock, demonstrated that there is no useful correlation between these two characteristics.

Theoretical studies based on the "capillary pressure-saturation" curves lead as well to results which indicate their imperfection.

Having studied the reasons for these failures, the authors conclude: It is and it will likely remain impossible to connect theoretically the permeability of rocks with shape-parameters easy to measure; it is necessary therefore to fall back on an empirical process; and they show that measurement of the displacement pressure permits one to calculate the permeability of a sample of known porosity, with a limit of error no greater than that of any other method.

Drilling Emulsion

R. A. HENKES, Shell Caribbean Petroleum Co., Maracaibo.

SINCE their introduction in 1943, emulsion muds have developed into an important class of drilling fluids, which now has its own place in modern drilling operations.

The report reviews the history of their development, their preparation, principal properties, and present application, and gives some suggestions for further research.

Numerical Methods for Cycling And Flooding Problems

C. H. FAY and M. PRATS, Shell Oil Co.

THE computation of two-dimensional flow fields for use in the determination of invasion patterns in cycling and flooding problems by numerical methods, in particular the relaxation method of Southwell, is discussed from a general point of view for both the single-fluid case, usually handled by an analogue computer (the potentiometric model), and the two-fluid case, for which no analogue computer has yet been devised. Several single-fluid examples are given. Finally, a two-fluid problem, the conventional five-spot flooding pattern, is treated, an effective fluid conductivity for the displacing phase four times that for the displaced phase being assumed. A break-through recovery of 45 per cent, in contrast with the single-fluid result of 72 per cent, is found.

Emulsion Drilling Fluids

DOYNE L. WILSON, Oil Base, Inc., Compton, Calif.

EMULSION drilling fluids provide a new and useful technique for the oil industry, characterized by a wide range of properties, performance, and maintenance. Emulsion stability is a function of the resistance of the emulsifier to chemical reaction with contaminants, and this factor has a very important bearing on the performance of the emulsion drilling fluid.

Generally speaking, emulsion drilling fluids have the following advantages over clay-water fluids: (1) lower fluid losses, (2) holes are closer to gage, (3) greater drilling speed, (4) lower drill-pipe torque, (5) better lubrication, (6) easier control.

Excellent electric logs are obtained in emulsion drilling fluids with normal electrical survey equipment; this may be of prime importance in a wildcat well where the operator desires a better drilling fluid than clay-water mud, but does not wish to use an oil-base fluid.

Conversion of an emulsion fluid to a lime base emulsion drilling fluid confers exceptional resistance to contamination by cement, salt, and anhydrite.

Well Cementation

R. P. MOSCRIP, Shell Oil Co., Houston.

CALIPER, radioactivity, and temperature surveys, scratcher and centralizer equipment, and running of casing are discussed. Circulation, cementation, and the movement of the casing during these periods is more fully covered.

Use of this technique has resulted in a considerable monetary saving by obtaining a greater percentage of successful primary cementations and the consequent elimination of many expensive squeeze jobs. The following conclusions appear justified from the work done so far:

1. The only time any real control can

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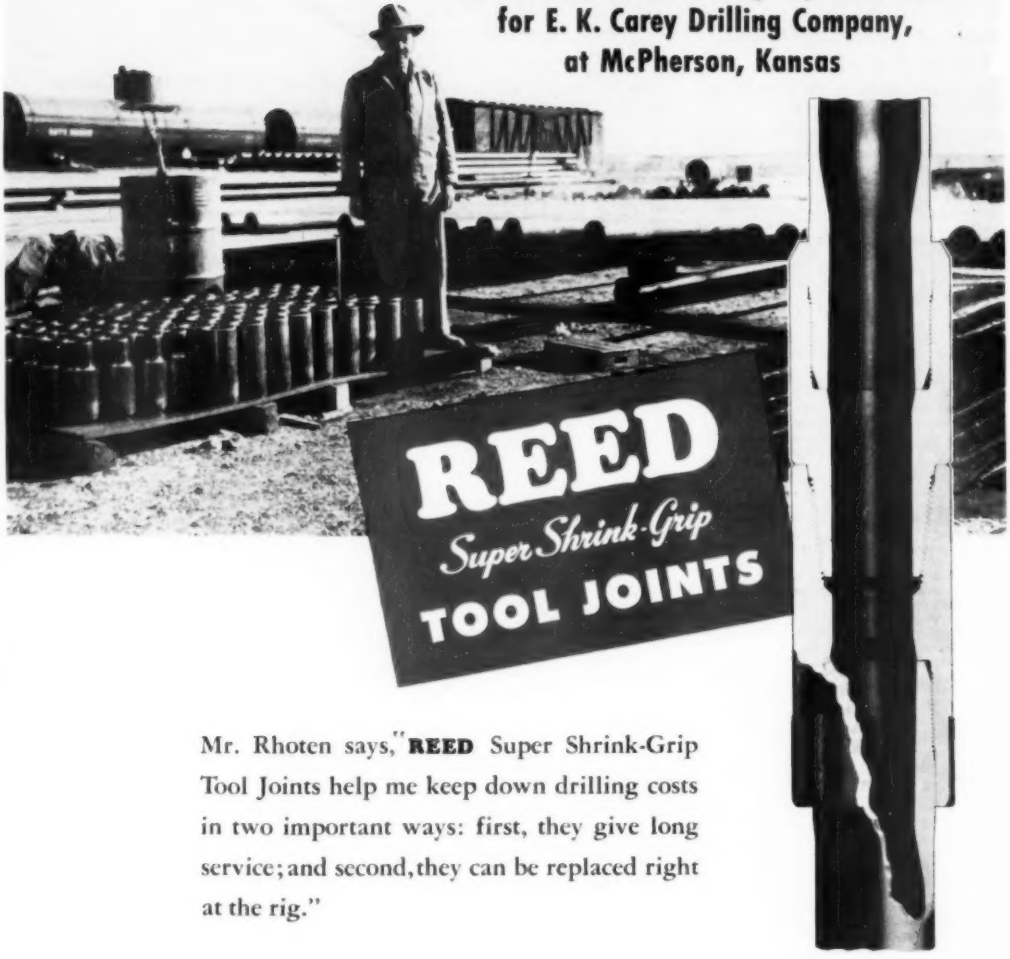

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be exercised over the placement of cement in a well bore is during the primary cement job; and unless costly radioactivity surveys are employed, the only time the approximate position and distribution of the cement can be determined is very soon thereafter.

2. The scratcher-centralizer-reciprocation technique which has been developed provides this necessary control, and the temperature survey curves supply the proof of it.

3. Thorough advance planning of the casing job and competent supervision of both the running and cementation phases are essential to successful application of the technique.

4. It is possible to reduce remedial squeeze jobs from an average of 0.91 per oil string cemented, to 0.04.

5. Reduction in primary cementation failures resulted in a minimum net saving of $20,000 on the original completion cost of 47 wells.

6. The average cost of using centralizers and ring type scratchers over a several hundred-foot interval, including running caliper and temperature surveys, is $1.25 per foot of scratcher covered section.

7. Under normal conditions, with use of scratcher - centralizer - reciprocation technique, we may reasonably expect to obtain satisfactory primary cementation of zones 5,000 ft., or more, above the casing shoe.

8. Temperature surveys generally can be interpreted well enough to indicate whether adequate protection has been afforded to upper zones, or whether channeling or loss of cement to formations has been excessive.

9. Precautionary squeezing, as a standard practice preliminary to completion, can be eliminated, where temperature survey, or other check, has indicated a successful primary cementation.

Problems of Subsurface Formation Slippage in the Drilling and Production Of Oil Wells

G. M. ANDERSON, Baker Oil Tools, Inc., Los Angeles.

AFTER a brief introductory discussion on the general subject of earth movements in their relationship to the drilling and production of oil wells, this paper takes up in great detail a consideration of the specific problem of slight, relatively deep slippages resulting from low-intensity tremors in an area subject to recurrent tremors. The area discussed is the Long Beach Harbor area of southern California and the paper describes and analyzes the development and application of a preventive technique involving a "bell hole" scraping program that is now being followed in that area for the protection of wells during drilling and production.

In conclusion, the paper presents tangible evidence of the success of the recommended preventive method.

Effect of Particle Size on Physical Properties of a Gulf Coast Drilling Mud

PROF. GEORGE H. FANCHER, University of Texas, Austin; and S. C. OLIPHANT, Stanolind Oil & Gas Co., Houston.

THE fractions having a limited range in particle size separated from a typical Texas Gulf Coast shale drilling mud have been recombined systematically into a regular series of mud systems for which the viscosity, gel-strength, and waterloss have been obtained. The data have been studied and the effect of particle size on the physical properties of the mud systems has been ascertained to the end that the viscosity can be predicted for a given concentration of solids in a drilling-mud system provided the distribution of particle size is known.

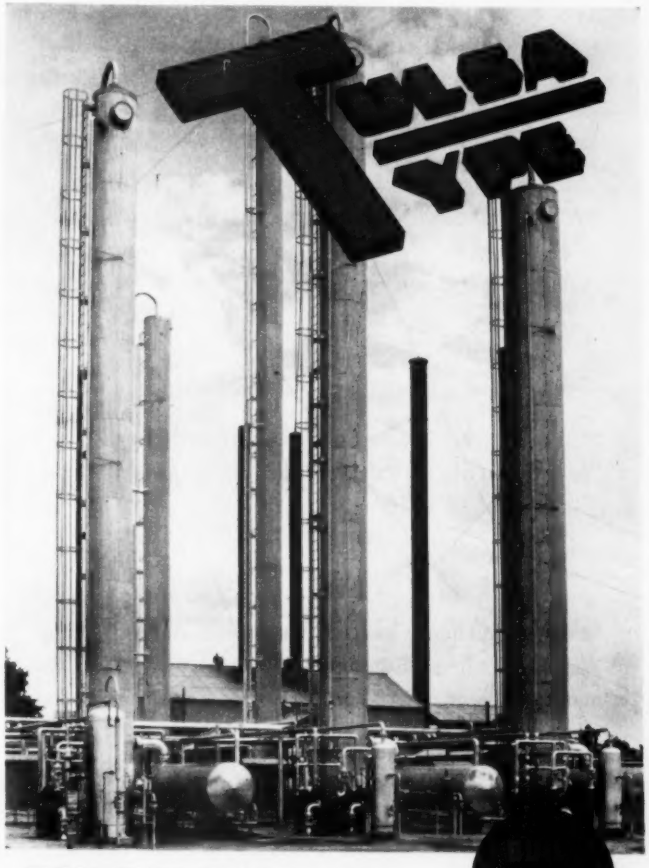
Compte-Rendu de Queloques Etudes Originales Faites sur Le Gisement de Soultz sous Forets (Bas-Rhin)

A. HOUPEURT, Institut Francais du Petrole; and J. LOISEAU and A. SERVASIER Pechelbronn S.A.E.M.

IN study of percentage of water in production of flowing wells draining an oil pool subject to water drive only, it has been found that water percentage may be considered as a linear function of the gross-production rate and of the cumulative oil production for periods of dynamic equilibrium. The equation used is mainly justified by its practical value, although its theoretical base has also been studied.

The interpretation of pressure diagrams resulting from formation tests is considerably improved when using the diffusivity equation for the calculation of the formation pressure and for the expression thickness x permeability / viscosity, named "testindex," by which the productivity index is substituted.

This method permits establishing the relations existing between various wells because of a more exact knowledge of their static bottom-hole pressures. It also affords a more satisfactory method of pre-



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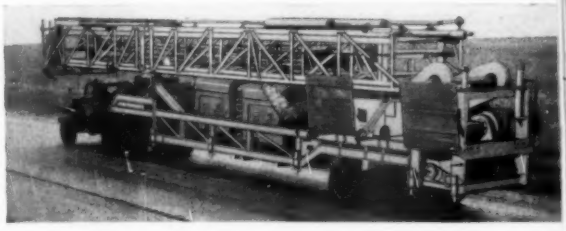

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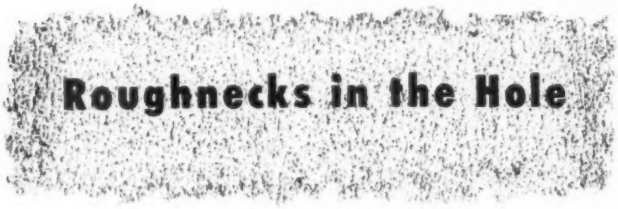
dicting initial productions than by using the productivity index, which is not valid in most cases.

Problems in Relative Permeability Measurement

WALTER ROSE, Texas Petroleum Research Committee, Austin.

THIS paper gives a general discussion of some of the factors involved in planning laboratory experiments to measure oil recovery. Special emphasis is given to the problem of measuring gradients of pressure which are needed for the computation of mobilities descriptive of mixture flow phenomena. In addition, some new gas relative permeability data are presented, the theory of the Hassler scheme of wetting liquid relative permeability is developed, and four new techniques of measurement are proposed. These latter are designated as the "series," the "parallel," the "single-barrier," and the "adjustable manometer" methods. It is concluded that these developments point to the feasibility of making the measurements required to obtain reliable relative permeability data. Thus it is suggested that the major problem remaining to be solved is that of developing the criteria which will show in particular cases when the reservoir prototype is adequately represented by the laboratory model.



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Quantitative Interpretation Of Radioactivity Logs

R. E. FEARON and E. S. MARDOCK, Well Surveys, Inc., Tulsa.

THIS paper describes the application of radioactivity logging curves to the problem of obtaining quantitative information on the porosity of the reservoir rocks. The responses of radioactivity curves to lithologic conditions, both qualitative and quantitative are discussed in the light of basic theory in order to acquaint the reader with the principles upon which these logging methods operate. The classes of error involved in making radioactivity logs are enumerated and discussed. Attention is paid to the principles of statistics underlying the recording of all radioactivity measurements.

Application of Gaussian error theory is discussed. Practical methods for estimating the significant limits of accuracy of well logging data are given. The application of the neutron curve to the estimation of porosity is demonstrated by practical examples on wells in West Texas and Alberta.

Hydraulic Long Stroke Units For Pumping Problem Wells

D. M. JONES, Axelson Manufacturing Co., Los Angeles.

IN order to allow the cycle rate to remain in the advantageous range, a new device was required to permit longer strokes than possible with beam pumping units. The hydraulic long-stroke unit was accordingly developed, and has successfully filled this need. Current units provide up to 30 ft. of stroke, and a total polished-rod travel of about 350 ft. per minute. This can be, and is, used successfully, whereas experience indicates that this speed would be too great for satisfactory rod life with conventional beam units (e.g. 35 cycles per minute with a 5-ft. stroke).

The author discusses these new units as machines and as production units, with the purpose of bringing to attention an extremely interesting and important new tool for producing oil.

Cretaceous Limestone Producing Areas, Mara and Maracaibo Districts, Venezuela

M. STEPHENSON, Shell Caribbean Petroleum Co., Maracaibo.

AN outline is given of the reservoir characteristics and production engineering of the important new Cretaceous limestone fields of the Mara and Maracaibo districts in western Venezuela.

These fields are characterized by large reservoir-rock volumes and thick oil columns, but extremely low matrix porosities. Their productivity is due to the presence of widely distributed fissure systems, and many of the wells have high potentials. Development has been rapid and considerable care has been taken to produce the reservoirs soundly, conserving their natural energy and avoiding waste.

La Dynamique du Train de Forage

J. P. BERNHARD, Regie Autonome des Petroles.

THE nonuniform movements of a drill-pipe string are characterized by either transitory or prolonged kinds of vibration, the analysis of which constitutes the goal of

the present study. These vibrations may be divided into two categories: On the one hand, longitudinal vibrations and vibrations of torsion, subject from a mathematical point of view to the equation of sound; on the other hand, transversal vibrations, depending on a much more complex law. The author shows, in respect of longitudinal vibrations, how it is possible to analyze in great detail certain phases, even complicated, of drilling work, as for example jarring.

The results presented coincide qualitatively with what can be ascertained by attentive observation. Unfortunately, the author, lacking adequate instruments, was not able to carry out experiments which would have permitted quantitative verification. It is his hope that this lack will soon be made up.

Solvent Washing of Wells in the Digboi Field, Assam (India)

H. B. KALE, J. WYLLIE, and H. R. TAINSH, Assam Oil Co., Ltd.

THE crude from Digboi field contains a large amount of paraffin wax and this has always presented serious production problems. With the fall in pressure of the reservoirs, and with the fall in fluid levels, it was suspected that wax was being deposited behind screen pipe and in the pores of the sands.

A number of methods of clearing the wax from the wells has been tried in the past, but without success. During World War II it was discovered that injection of kerosine in a shallow well of small caliber gave an improvement in production; subsequently a number of experiments were made in order to improve the technique, and the method has now been applied to all lower-pressure wells in the field, both deep and shallow. At present a total of about 250,000 gal. of solvent a month are injected; this is recovered and it is estimated that during 1949 production was increased by more than 250 bbl. per day as a result of the solvent washing.

Three Notes on Modern French Drilling Technique

J. J. MOTHRE, Regie Autonome des Petroles, Paris.

THE testing of the condition of drill pipes by subjecting them to a longitudinal pulling force in a new-type hydraulically operated tensioning machine is described.

A new internal pipe-cutting tool is detailed.

Method and apparatus for taking orientated side-wall cores are presented.

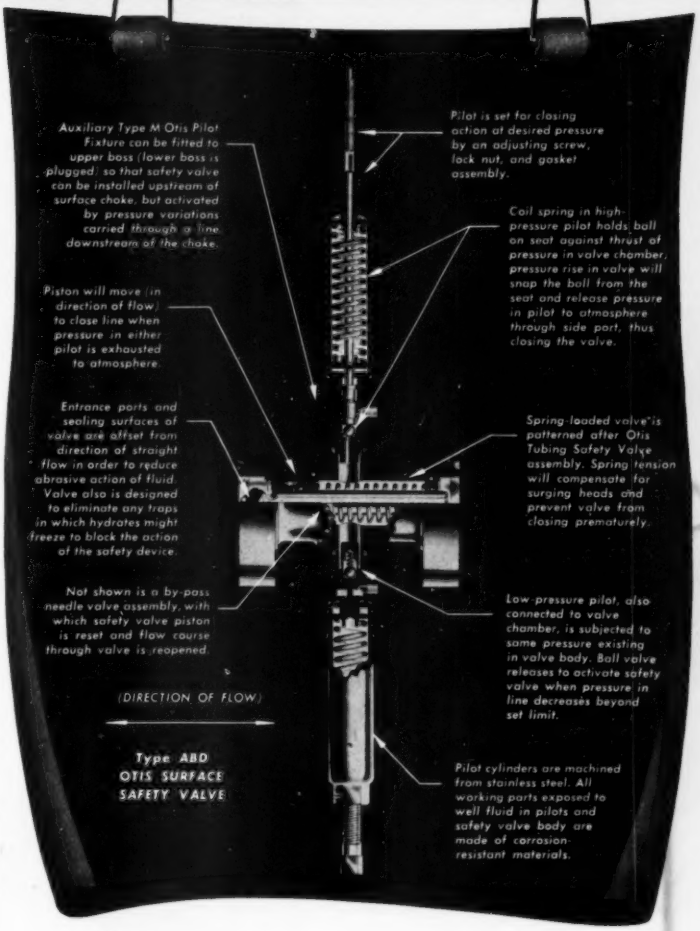
Application of Thermal Energy For Exploitation of Oil Fields of Extremely High Oil Viscosity

ADOLF F. WINKLER, Pram Erdol-Explorations-GmbH., Taufkirchen (Pram), Austria

PRODUCTION of crude oils of extremely high viscosity (η> 70,000 centipoises at 20° C.) from wells is one of the economic problems in the oil industry. Such oils cannot be produced by conventional methods.

A special production process has been developed, which by the application of heat guarantees an economic exploitation.

The process consists in the introduction of heat into the formation by injecting steam, by electric heating, or similar methods. The introduction of the heat into the formation causes an alteration in the layout of the stream and equipotential lines resulting in: (1) an increase of the production rate, (2) a higher total production of the well, (3) a better ultimate recovery of


Auxiliary Type M Otis Pilot Fixture can be fitted to upper boss (lower boss is plugged) so that safety valve can be installed upstream of surface choke, but activated by pressure variations carried through a line downstream of the choke.
Pilot is set for closing action at desired pressure by an adjusting screw, lock nut, and gasket assembly.
Coil spring in high-pressure pilot holds ball on seat against thrust of pressure in valve chamber; pressure rise in valve will snap the ball from the seat and release pressure in pilot to atmosphere through side port, thus closing the valve.
Piston will move (in direction of flow) to close line when pressure in either pilot is exhausted to atmosphere.
Entrance ports and sealing surfaces of valve are offset from direction of straight flow in order to reduce abrasive action of fluid. Valve also is designed to eliminate any traps in which hydrates might freeze to block the action of the safety device.
Spring-loaded valve is patterned after Otis Tubing Safety Valve assembly. Spring tension will compensate for surging heads and prevent valve from closing prematurely.
Not shown is a by-pass needle valve assembly, with which safety valve piston is reset and flow course through valve is reopened.
Low-pressure pilot, also connected to valve chamber, is subjected to some pressure existing in valve body. Ball valve releases to activate safety valve when pressure in line decreases beyond set limit.
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Type ABD OTIS SURFACE SAFETY VALVE
Pilot cylinders are machined from stainless steel. All working parts exposed to well fluid in pilots and safety valve body are made of corrosion-resistant materials.

X-Ray of a Type A

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It is recommended for trees, flow wings, gathering lines, etc., where full-opening gate valves are not required. It is a self-contained, fully automatic unit that is more economical and more dependable than personal supervision of flowing wells . . . protection against fire hazards, waste of oil and gas, and damage to nearby property and equipment. Ask the Otis office nearest you about other important operating features and for technical details and illustrated literature. There's no obligation whatsoever, and afterwards you'll be better informed on the better methods of safe production.

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the field, and (4) a reduction of the drilling costs in consequence of an increased well spacing.

The field, producing by the process, is described from a geological and engineering standpoint. Data are given regarding the characteristics of the formation and the oil.

Equations are given for calculating the production rate, the total production per well and the time of exploitation in bottom-water-drive fields. Analytic calculation of production has been considerably simplified by using the combined analytic and geometric treatment given in this paper.

Information on Hydrafrac Process

JOHN C. PADGETT, Halliburton Oil Well Cementing Co., Duncan, Okla.

THE author describes the Hydrafrac procedure and outlines the factors that are considered in applying the process. Results of the tests on the first 316 wells treated show 72.5 per cent success with an average increase in production amounting to 45.8 per cent per day.

Connate Water Content of Oil Reservoir Rocks

WALTER RUEHL, Deutsche Erdoel-Aktiengesellschaft, Weitze, Germany

WE are able directly to determine the actual water content of oil-sand samples taken from mines. Capillary pressure tests conducted for the sake of comparison in order to find the irreducible interstitial water content, have yielded values being twice or thrice as high. This leads to the conclusion that the widely used capillary-pressure method is probably unable to reproduce a reduction of the water content to the same degree as might be attained in nature in the course of geological ages.

This conclusion, which is being confirmed by direct geological observations and considerations, is of the utmost practical importance, insofar as it will change not only the reserve estimates but also the probable recovery factor.

The exact definition of the connate-water concept at its lower limit is thereby also changed and complicated.

Communication sur la Rheologie Des Boues de Forage

R. METROT, Societe Cherifienne des Petroles, Rabat, Morocco

DRILLING muds have complicated rheological properties, which can be studied only with the aid of several different methods. The Bingham equation which defines the most simple concept of a plastic body is a valuable working hypothesis. The yield value is a critical tangential tension which separates two clearly distinct states. In the first state the muds have elastic properties but do not follow Hooke's law. An equation containing both the rigidity modulus and the yield value is suggested.

The instantaneous elastic deformation is followed by a reactive deformation which is schematized by concept of Kelvin. Furthermore, the elasticity is accompanied by a very high viscosity, which is of the order of millions of poises. As Navier's law does not apply to this slow flow, another equation is suggested: it can define a concept of a dilatant liquid.

Great difficulties are encountered in determining the exact yield values, which are due on the one hand to the necessity of limiting the sample by a wall upon which it reacts, and on the other hand to the macroscopic heterogeneity of the muds.

In the second state the Bingham equation is in general a sufficient approximation; however, the plasticity appears always to be accompanied by thixotropy. The latter affects the yield value, not the viscosity.

Coarse muds have a very slow thixotropy; when at rest it is imperceptible. Colloidal bentonite gels are characterized by a much quicker thixotropy, which is rapidly accelerated on stirring.

Rheopexy is considered to be only an aspect of thixotropy. Other evolutional phenomena: aging, peptisation, lamination, etc., are briefly discussed.

Pulsations or statistical variations of the flow rate seem to be due to macroscopic heterogeneity.

Latest Developments in Directional Drilling

H. JOHN EASTMAN, Eastman Oil Well Survey Co.

DURING the past few years, modern techniques and methods have increased vastly the applications and possibilities of the science of directional drilling.

Such topics as "Directional Drilling Tools," "Deflection Tool Orientation," "Well Spacing and Clearances on Drilling Sites," "Factors Affecting Directional Programs," and "Achievements of Directional Drilling" are discussed in detail. Future trend for such operations will be toward simplification, and that some day directional wells will be drilled in as routine a manner as straight holes are today.

Status of the Drill as an Exploration Tool

W. F. BATES, Shell Oil Co., Los Angeles

FROM a review of the success of the various exploration methods employed in the search for oil over the last 50 years, it is apparent that current methods have reached a stage of diminishing returns. Barring development of new or greatly improved exploration technique, it seems probable that the oil industry must now rely heavily on the drill as an important means of locating prospects.

With this probability in view, the paper discusses: (a) the general problem of reducing the cost of exploratory drilling without sacrificing the drill's geological resolving ability, (b) some definite accomplishments in reducing drilling costs, and (c) other lines of approach toward making the drill economically attractive as an exploration tool.

Polytropic Flow in Gas Wells

PROF. HARRY H. POWER, University of Texas; and PROF. JAMES COULL, University of Pittsburgh

EQUATIONS are developed for the vertical flow of natural gas through tubing or casing. Since flow in gas wells, ordinarily, is neither isothermal nor adiabatic, the paper is concerned with the general or polytropic process.

The equations have been derived by combining the general equations with the Fanning friction-factor concept, modified in this work to include the effect of the heat lost from the flow string to the surrounding formation. The inherent irreversibility in the flow process is expressed in the value of the modified polytropic exponent "n."

The equations developed for polytropic flow may be applied with slight modification to any gas well, and will facilitate the determination of flow rates and pressure differentials. They also assist in the selection of the proper diameters of flow strings to meet optimum terminal pressure and temperature conditions, and the selection of the proper rates of flow for given diameters of flow strings to meet optimum terminal pressures and temperatures.

Surface Observations for Study Of Oil Reservoir Conditions

W. J. BAKER, Anglo-Iranian Oil Co., Ltd.

THE ease, speed, and accuracy with which surface measurements of pressure can be made are of great practical advantage provided that the relationship between surface and bottom-hole pressures is properly understood. Methods of calculating bottom-hole pressures from surface pressures are discussed in detail in the case of an oil well under both closed-in and flowing conditions, and the determination of the necessary physical characteristics of the oil is described.

The problem of the closed-in gas well is also considered. Finally the value of special observation wells is emphasized, and the relationship between changes of surface and bottom-hole pressures is discussed.

Electrical Logging in Limestone Fields

H. G. DOLL and MAURICE MARTIN, Schlumberger Well Surveying Corp., Ridgefield, Conn.

A GENERAL outline is given of the particular conditions prevailing in limestone fields as they affect electrical logging. The improvements introduced into the interpretation of the conventional logs during the last few years are described.

The principles underlying the new methods of logging—limestone sonde, selective SP logging, micrologging, induction logging, laterolog—are indicated, and the contribution of these methods to a more accurate investigation of limestone formations is discussed. The paper is illustrated by field examples from various countries.

Field Processing of Oil and Gas

KENNETH B. BARNES, managing editor, The Oil and Gas Journal, Tulsa, Okla.

VARIOUS operations in the category of field processing of crude oil and natural gas have expanded enormously during the past decade, both from the standpoint of technological advances and investments in field installations. Previously there had been only a limited number of field process operations coupling the gap between the producing wells on the one hand and the refinery receiving points on the other. The expansion in this intermediate ground has now become so substantial, however, that all operations in between can now be collectively classified under the heading "Field Processing."

The situation has developed to the point where certain similarities now exist between "field processing" operations for crude oil and natural gas, and the classical grouping of "unit operation" subjects in chemical engineering. Field-processing operations include the following subjects: Treating and separation, crude-oil stabilization, natural-gas dehydration, natural-gas desulfurization, the technology of cycling, natural-gasoline, and L.P.G. plants; the reservoir-injection processes (low-pressure gas and water drives, and pressure maintenance by natural gas and extraneous water), special-products plants, production of elementary sulfur, solid carbon dioxide, carbon black, and also specialized matters dealing with field gathering systems. The paper

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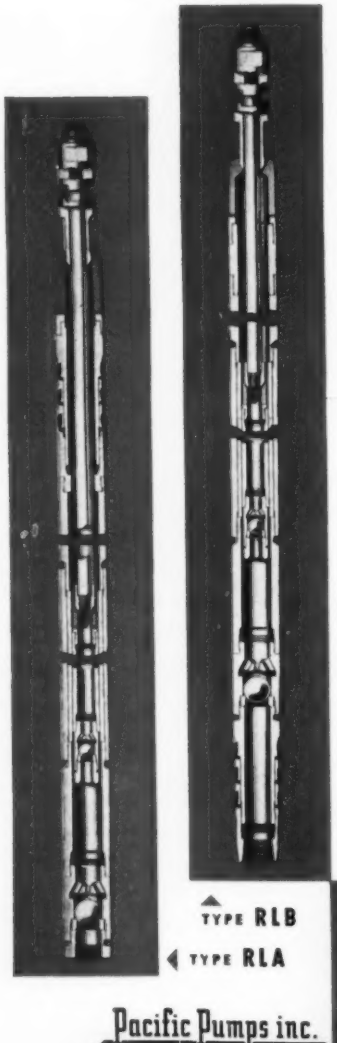

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details primary objectives for each of the foregoing and summarizes technological advances made during the past decade.

Multiphase Flow in Idealized Capillary Systems

PROF. S. T. YUSTER, University of California, Los Angeles.

AN analysis has been made of relative permeability in simple capillary systems and it was found that the relative permeability to oil is not a single-valued function of the saturation but is also dependent upon the viscosity ratio. It was also indicated that the relative permeability to the oil phase may be greater than one.

This discussion has indicated that the relative permeability to oil in an idealized capillary system is not a simple function of the saturation but is dependent upon the viscosity ratio of oil to water. For values of this ratio greater than one, the relative permeability to oil will go through a maximum as the oil saturation decreases, attaining values greater than one, to give two saturations at which the relative permeability is the same. These results point to the desirability of using the actual reservoir fluids or at least matching their viscosities in the determination of relative permeability.

Directional Permeability Trends

PROF. RICHARD V. HUGHES, Stanford University.

GEOLOGISTS and petroleum engineers are familiar with marked differences in permeabilities of oil sands when measured across and parallel to the bedding. Imbrication and orientation of the elongated mineral grains under normal processes of deposition account for these differences. Research, utilizing over 300 core samples, mostly from Bradford field, Pennsylvania, shows that differences in permeabilities within the plane of bedding of a single core sample also may exist and follow a directional pattern. Directional permeabilities within the planes on bedding of the Bradford sands show marked trends at right angles to each other. Permeabilities in the direction of the minimum trends may be only 60 to 75 per cent of those in the direction of the maximum trends. The geographical direction of these trends is quite regular throughout the entire producing section of the field. The probable significance of such directional-permeability trends in the exploration for and production of oil is discussed. As a result of the studies described it is to be recommended that every prospective and producing oil sand be tested for directional-permeability trends.

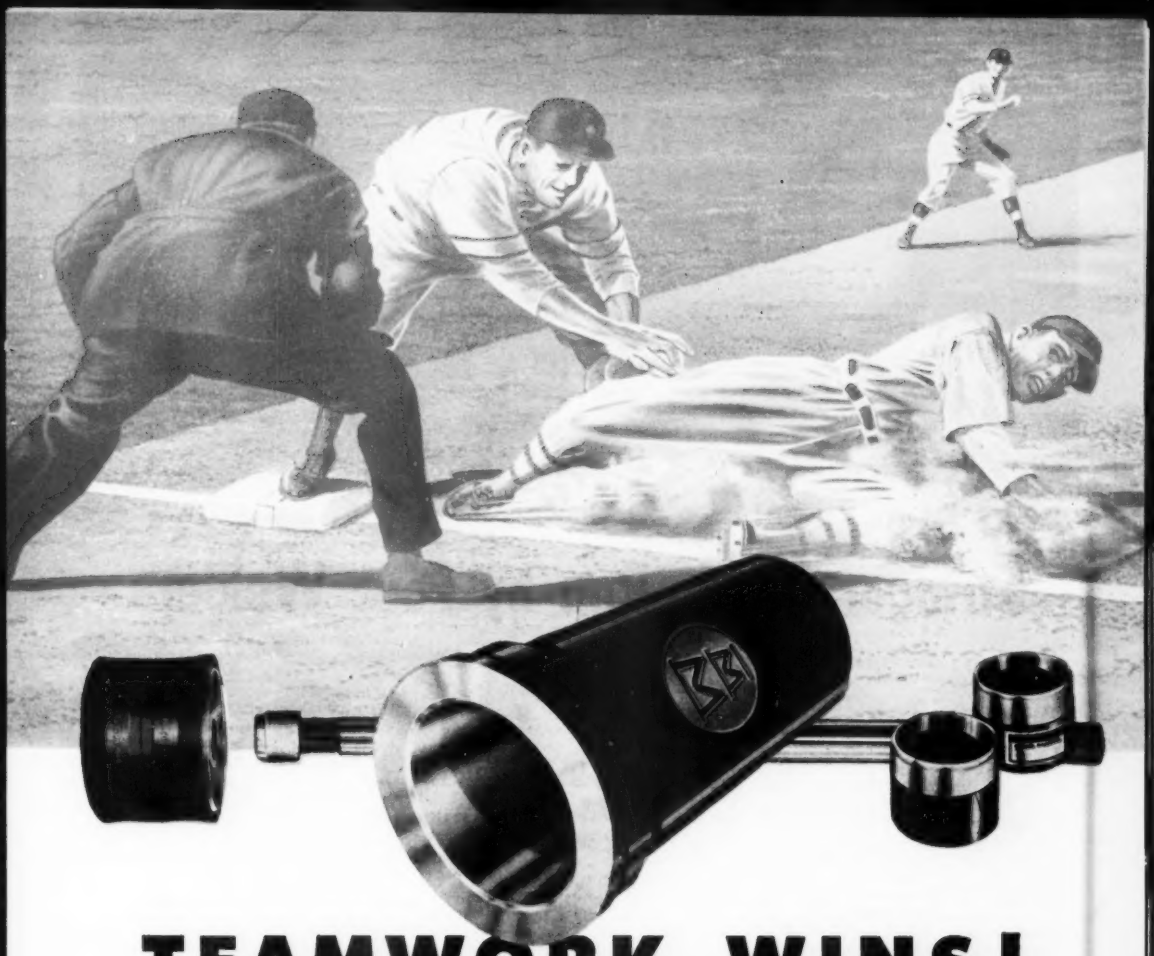
Oil Recovery by Fluid Injection

PAUL D. TORREY, Petroleum Consultant, Houston.

OIL recovery by fluid injection is a process in which part of the energy used for moving oil through the reservoir is derived from extraneous sources. By employing this definition a reasonably clear distinction can be made between various fluid-injection processes such as: secondary recovery by gas or water injection, and pressure maintenance by gas or water injection.

The mechanics of fluid injection are discussed in considerable detail. The manner in which the contents of reservoirs and the characteristics of the reservoirs themselves control the injection of fluids and the production of fluids is emphasized. Methods whereby the effectiveness of fluid-injection operations may be evaluated are proposed.

Possibilities for increasing the efficiency of oil-recovery operations are considered. New methods that are currently in process of development or are in various stages of initial field application are described.



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Four welders running stringer beads.

Spacing preparatory to running stringer beads.

Stringer Beads Run by Four Welders

by Shannon L. Pound*

STRINGER beads have been run successfully by four welders working simultaneously on 30-in. pipe laid by Western Pipe Line Constructors, Inc., in the Hungerford-Refugio, Tex., section of the Texas Illinois Natural Gas Pipeline Co. system. Satisfactory results were obtained by avoiding difficulties which have baffled previous attempts to use four instead of the customary two stringer-bead welders.

Heretofore such four-man team experiments have often been unsatisfactory because the welders got in each other's way or because pipe was not fed fast enough to lineup operations to produce sufficient gain in the number of welds made.

Western overcame both of these drawbacks by: (1) four welders were found who could and would work harmoniously together; (2) a second side-boom tractor was used by the pipe gang to expedite feeding of pipe. Consequently, there was always a joint of pipe ready and waiting for the next lineup. The procedures followed in the four-man stringer bead welding produced high-quality results, according to X-ray photographic records.

The first tractor, engaged in holding the joint during running the stringer bead, lowers the joint to the skids after completion of the bead. Then this tractor pulls out around the second tractor and proceeds to get another joint. By this practice a safety hazard is eliminated for there have been serious injuries and even fatalities when only one tractor is used.

Close attention was given to having the proper spacing for the entire circumference of the weld before starting the stringer bead. The internal lineup clamp was held longer than usual before being pulled out on completion of the stringer bead to avoid the possibility of weakening the bead by premature withdrawal.

Welding heat used was consistently lower and steadier. This was because where there are only two stringer-bead welders, they naturally have a tendency to increase the welding temperature in order to get more footage, thus giving the possibility of a "burn through." Where there is a tight space, due to improper spacing, the temperature may be reduced to a point where there is lack of penetration (not getting the weld all the way through the pipe). Also in raising and lowering the temperature, gas pockets are liable to be formed in the weld.

With the four-man method, the length of each man's section of the bead is short. Therefore he seldom changes heat and if he does, it is very slightly and not enough to cause gas bubbles or a burn through. With a good stringer bead, the soundness of the weld is nearly assured because the quality of the finish beads is more easily controlled. With this method, it has been found possible consistently to get more than a 30 per cent increase in pipe-gang footage.

Procedures described in this article were observed while the author was inspector for Texas Illinois during recent construction of the Hungerford-Refugio section. R. L. McMillan, spread superintendent, and Rex Pickens pipe foreman, developed the four-man method under the direction of J. P. Neill, president, and Charles LeNoir and E. G. Morrison, vice presidents of Western Pipe Line Constructors, Inc.

*Inspector for Great Lakes Pipe Line Co., Bartlesville, Okla. Pound was inspector for Texas Illinois Natural Gas Pipeline Co. during operations described in this article.

Two tractors operating with the pipe gang for lineup and stringer-bead operations.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Petrochemical Manufacture-2

Note—This is a continuation of the answer to P.F.C. who wishes to know about petroleum chemical manufacture.

In last week's issue it was shown that the production of chemical base stocks from petroleum increased from about 500,000,000 lb. in 1942 to nearly 5 billion pounds in 1949. Manufacturers had grown from perhaps 1 in 1935 to over 61 in 1949. The productions of certain major base stocks were tabulated and some of the major manufacturers were named.

Table 3 is an elaboration of Table 2 of last week. It shows the kinds of major chemical base stocks produced, and separate production figures for those chemicals that are marked with an asterisk were shown last week in Table 2.

The final end uses of the base stocks of Table 3 are not completely known but it is judged that the chemicals shown in Table 4 are made, at least in part, from petroleum base stocks. This list of chemical products was obtained by noting the products made by chemical manufacturers that are thought to be operating on petroleum base stocks. Such information is available in the yearly issues of "Synthetic Organic Chemicals," U. S. Tariff Commission. The 1949 issue of this booklet is Report No. 169 of the Second Series.

TABLE 3—MAJOR CHEMICAL BASE STOCKS MADE FROM PETROLEUM

Aromatics and Naphthenes

Aromatic distillates and solvents
Benzene:
  1 degree
  2 degree
  90 per cent
  Other grades
Cresylic acid (less than 75 per cent distilling at 215° C.)
Crude sodium carbolate & phenolate
Crude xylene-naphtha, 123°-190° C.
Mixed petroleum peroxides
Naphthenic acid:*
  Acid number less than 150
  Acid number 150-199
  Acid number 200-224
  Acid number 225-249
  Acid number 250 and over
Naphthenic acid, sodium salt, crude
Toluene:*
  Pure commercial grade, 2°
  Solvent grade, 90 per cent
  All other
Xylene:*
  Nitration grade, 3°
  Aviation grade
  All other
All other crudes from petroleum

Aliphatic Hydrocarbons

C_1 hydrocarbons: Methane
C_2 hydrocarbons:
  Ethane
  Ethylene*
C_3 hydrocarbons:*
  Propane*
  Propylene
  Propane-propylene mixture
C_4 hydrocarbons:*
  1-3 Butadiene,* grade for rubber (Elastomers)
  n-Butane
  1-Butene
  2-Butene
  1-Butene and 2-butene fraction*
  Isobutane
  Isobutylene
  All other
C_5 hydrocarbons:
  Isopentane
  Isoprene
  n-Pentane
  1-Pentene
  2-Pentene
  Pentenes, mixed
C_6 hydrocarbons:
  Di-isopropyl (2,3-Dimethylbutane)
  n-Hexane
  Hexenes, mixed
  Isohexane
  Neohexane (2,2-Dimethylbutane)
C_7 hydrocarbons:
  n-Heptane
  Isoheptane
  Isoheptenes
C_8 hydrocarbons:
  Di-isobutylene*
  2,2,4-Trimethylpentane (Iso-octane)
C_{12} hydrocarbon (Tetrapropylene)
Dodecene
Nonene
Polybutene
Tri-isobutylene
Mixed C_2 and C_3 hydrocarbons
Mixed C_3, C_4, C_5 hydrocarbons
Mixed C_5, C_6, C_7 hydrocarbons
Mixture of C_{12} and heavier olefinic hydrocarbons
All other aliphatic hydrocarbons

*Separate production figures for these chemicals were shown last week in Table 2.

TABLE 4—SOME OF THE CHEMICALS THAT ARE PROBABLY BEING PRODUCED FROM PETROLEUM*
(Other nonpetroleum chemicals are also used in making most of these chemicals.)

Acetaldehyde
Acetic acid
Acetic anhydride
Acetone
Alkane sulfonic acids
Alkyl aryl sulfonates
Alkyl mercaptans
Allyl alcohol
Allyl bromide
Allyl chloride
Aluminum isopropylate
iso Amyl acetates
Amyl alcohol (primary, normal, active and iso)
Amyl alcohols (primary, secondary and tertiary)
n-Amyl bromide
Amyl chlorides
Amyl ether
Amyl mercaptans
Amyl amines, mono and di
Amylnaphthalenes
Amylnaphthalene (mono)
Amylnaphthalenesulfonic acid, mono and salt
o-Amylphenol
n-sec-amylphenol
p-tert-amylphenol
poly-sec-amylphenol
Aromatic distillates and solvents

Benzene (1°, 2° and 90 per cent)
Biphenyl
Bromobenzene
1,3-Butadiene
iso Butane
n-Butane
1-Butene
2-Butene
Butyl ammonium dodecylbenzenesulfonate
iso and n-Butylbromides
Butyl chlorides
p-tert-butylphenol
iso Butylene
Butyl stearate
Butyl acetates (normal and secondary)
Butyl alcohols (normal and iso)
Butyl alcohols (secondary and tertiary)
Butylamines, mono, di and tri
Butylnaphthalenesulfonic acid, mono and salt
Butylbiphenylmonosulfonic acid, and salt

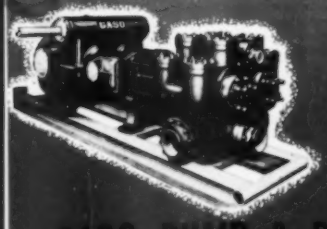
2-Chloro-6-phenylphenol
2-Chloro-6-phenylphenol, sodium salt
3-Chloro-p-toluene sulfonic acid and salt
Chlorobenzene
Chloronitrobenzene (m, o and p)
o-Chlorophenol
p-Chlorophenol
Chloropropene
Cresylic acid
Cumene
Cyclohexane
Cyclohexanol
Cyclohexene
Cyclohexylacetic acid
Cyclohexylamine

Decylbenzene
Decylbenzenesulfonic acid, and salt
Diacetone alcohol
Diallyl phthalate
Di'amyl sulfide
Dibutyl phthalate
Dibutyl sebacate
p-Dibromobenzene
o-Dichlorobenzene
p-Dichlorobenzene
Dichloropentanes
2,4-Dichlorophenol
Dichlorodiethyl ether
Dichloroisopropyl ether
Dicyclohexylamine
Dicyclohexyl phthalate
Diethylbenzene
1,4-Diethylene oxide
n,n-Diethyl-m-toluidine
Diethyl phthalate
Diethylaminoethanol
Diethylene glycol
Diethylene glycol diethyl ether
Diethylene glycol monobutyl ether
Di-isobutyl ketone
Diisopropyl
Diisobutylene
Diisoamylamine
Dimethyldihydroresorcinol
Dimethylcellosolve phthalate
Diphenyl oxide
Diphenyl mono-o-xenyl phosphate
Diphenyl octyl phosphate
Diphenyl phthalate
Di-2-ethylhexyl phthalate
2,6-Di-tert-butyl-p-cresol
Di(butylcellosolve) phthalate
Dioctylamine
Dipropylene glycol
Dipropylene glycol methyl ether
Divinylbenzene
Dodecene
Dodecylbenzene
Dodecyl mercaptans
Dodecyltoluenesulfonic acid, and salt

Epichlorohydrin
Ethane

*Judged from general knowledge and the manufacturers that list themselves as operating on petroleum stocks.

All the miles of 12 years' driving!



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Ethyl chloride
Ethylene dibromide
Ethylene dichloride
Ethyldiethanolamine
Ethylene
Ethylene glycol diethyl ether
Ethylene glycol monophenyl ether
Ethylene glycol
Ethylene glycol monobutyl ether
Ethylene glycol monoethyl ether (cellosolve)
Ethylene glycol monoethyl ether acetate
Ethylene glycol monoethyl ether and acetate
Ethylene oxide
Ethylether
Ethyl mercaptan
Ethyl monobromoacetate
Ethyl monochloroacetate
Ethyl monoethanolamine
1-Ethylnitrobenzene

Formaldehyde

Glycerol
Glycerol chlorohydrin, mono
Glycerol dichlorohydrin
Glycerol tripropionate

n-Heptane
iso Heptane
iso Heptenes
Heptadecanol
2-Heptylamine
iso Hexane (2,2-dimethylbutane)
iso Hexane
iso Hexane (2,3-dimethylbutane)
n-Hexane
Hexachloroethane
Hexachlorodiphenyl oxide
n-Hexyl alcohol
sec-Hexyl alcohol

Isooctane (2,2,4-trimethyl pentane)
Iso octyl alcohol
Isopropyl acetate
Isopropyl alcohol
Isopropylamine
Isopropylbenzene (Cumene)
Isopropylbromide
Isopropylchloride
Isopropylether
Isopropylnaphthalenesulfonic acid, and salt

Mesityl oxide
Methane
Methanol
2-Methyl-2,4-pentanediol
Methylamyl ketone
Methyl acetate
Methyl acetone acetal
Methyl bromide
Methyl chloride
Methylcyclohexane
Methylcyclopentane
Methylene bromide
Methylene chloride
Methyl isobutyl ketone
Methyl ketone
Methyl mercaptan
Methyl monochloroacetate

Naphthenic acid, crude sodium salt
Naphthenic acids, salts
  Aluminum
  Cobalt lead
  Calcium
  Cobalt
  Copper
  Iron
  Lead manganese
  Lead
  Manganese
  Mercury
  Nickel
  Zinc
Naphthenic acid
Neohexane
Nitrobenzene
2-Nitrobiphenyl
4-Nitrobipnenyl
p-Nitrophenol
Nonene
Nonylphenol

n-Octane
Octyl formaldehyde

Paraformaldehyde
Pentachlorophenol
Pentachlorophenol, sodium salt
Isopentane
Pentanol-2
Pentanol-3
1-Pentene
2-Pentene
Peroxides, mixed petroleum
Petroleum sulfonated aliphatics
  Ammonium salt
  Sodium salt
Petroleum sulfonated aromatics
  Aluminum salt
  Ammonium salt
  Barium salt
  Calcium salt
  Sodium salt
Phenol
Phenolic resins
Phenolic resins, cresols—formaldehyde

Phenolic resins, cresols—xylenols— formaldehyde
Phenolic resins, cresylic acid—formaldehyde
Phenolic resins, phenol—formaldehyde
Phenolic resins, phenol—cresole—xylenols—formaldehyde
Phenolic resins, phenol—formaldehyde—aniline
o-Phenylphenol
2-Phenylphenol, chlorinated
2-Phenylphenol, sodium salt
4-Phenylphenol
Phenylacetic acid
2-Phenylcyclohexanol
Phthalic anhydride
Phthalic alkyd resins
Phthalic anhydride—glycol (resin)
Phthalic anhydride—glycol—pentaerythritol
Phthalyl chloride
Polyamide resins (Nylon)
Polyamylnaphthalene
Polybutadiene—styrene (Buna S rubber)
Polybutadiene—acrylonitrile (Type N rubber)

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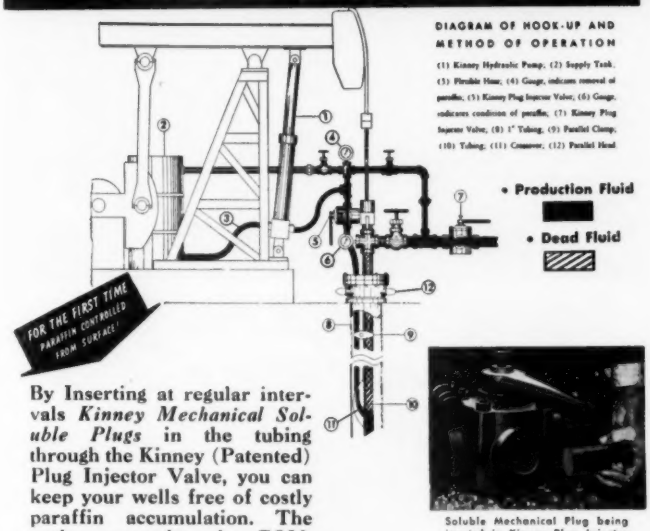
DIAGRAM OF HOOK-UP AND METHOD OF OPERATION
(1) Kinney Hydraulic Pump, (2) Supply Tank, (3) Flexible Hose, (4) Gauge, indicates removal of paraffin, (5) Kinney Plug Injector Valve, (6) Gauge, indicates condition of paraffin, (7) Kinney Plug Injector Valve, (8) 1" Tubing, (9) Parallel Clamp, (10) Tubing, (11) Crossover, (12) Parallel Head
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Polyisobutylene (Vistanex)
Polypropylene glycol
Polystyrene
Polystyrene—butadiene copolymers
isoprene
Propane
Propionic acid
Propionic anhydride
n-Propyl acetate
n-Propyl bromide
Propyl mercaptan
Propylene
Propylene chlorohydrin
Propylenediamine
Propylene dichloride
Propylene glycol
Propylene oxide

Resins, petroleum polymer
Rubber, synthetic
Buna S
Butyl
Type N
Vistanex

Sodium acetate
Sodium carbolate, crude
Sodium phenolate, crude
Sodium xylene sulfonate
Styrene
Styrene resins

Tetrachlorophenol
2,3,5,6-tetrachlorophenol, sodium salt
1,2,4,5-tetrachlorobenzene
Tetradecanol
Tetraethylene glycol
Tetraethyl lead
Tetrapropylene
Thiophene
Toluene (2°, 90 per cent and others)
Trichlorobenzene
Trichlorophenol
Trichlorophenol, sodium salt
Tricresyl phosphate
Trichloropropane
Triethylene glycol
Triethylene glycol dichloride
Triethyl phosphate
Triisobutylene
Triphenyl phosphate
Tri (p-tert-butyl hexyl) phosphate
Tripropylene glycol

2-Undecanol

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Chemical Treating Plant

(Continued from page 94)

with lime. A flow diagram for the process is given in Fig. 1.

Mixing of the waste waters is carried out in a square concrete tank, 5 ft. square and 4 ft. deep, which is lined with acid-resistant brick. The acidic mixture continuously overflows into an identical concrete tank, where it is mixed with hydrated lime suspended in a small amount of carrier water. The retention time in each of the tanks is 8 minutes. Agitation is provided by mixers. Speed of the stirrer in the mixing tank is 600 r.p.m., whereas that of the stirrer in the neutralizing tank is 300 r.p.m. The treating tanks are covered; and a fume duct, made of 6-in. spiral pipe, has been found adequate for the removal of sulfur dioxide fumes. This simple arrangement has completely eliminated any fume nuisance in the treating building.

Regulation of the treating operation is twofold: (1) control of the volume of process waste and storm water added to the constant flow of acidic waste water; and, (2) control of the amount of lime added. The flow rate of the process waste water from the holding tank to the treating plant is regulated by means of an automatic float valve which is operated in conjunction with an indicating flow meter. The flow of storm water from the basin is controlled manually.

Hydrated lime is applied to the acidic waste water by means of two automatic lime feeders. Only one of the feeders is normally operated; the second one serves as a standby.

To conserve water, treated effluent is used as carrier water for the lime feeders. The water is pumped to the lime feeders with a 15-g.p.m. bronze turbine-type pump, and its temperature is maintained at 80° F. by mixing with a small amount of well water through a thermostatically controlled

valve. Control of the carrier-water temperature avoids any difficulty with feeding damp lime, which occurs when the effluent is hot.

The treated water continuously overflows into a rectangular settling basin (effective dimensions: 12 by 35 by 8 ft.), equipped with a sludge collector of the flight skimmer type. The retention time in the settling basin at the design flow of 200 g.p.m. is 2 hours. Scum and oil which collect on the surface are removed by a hand-operated skimmer pipe which conducts the scum and oil to a collecting pit. Lime sediment and the oil and scum are pumped to a lagoon by means of a 50-g.p.m. centrifugal sludge pump located in the basement of the building which houses the treating equipment. A second identical pump serves as a standby. Free water which collects on the surface of the lime-sediment lagoon overflows into the storm-water basin, from where it is returned to the treating plant. The entire mechanical equipment for the treating plant was made by Walker Process Equipment, Inc.

Operation and Results

The waste-water treating plant was started in February 1950, and has operated satisfactorily from the beginning. The operating data given in Table 2 cover 6 representative months.

Because of the fluctuation in the properties of the process waste water, the periods during which it was alkaline or acidic, as well as the periods of concentration of acid and alkali, have been listed separately in Table 2. This should give a somewhat better picture of the operations than a single figure for the average reaction of a composite monthly sample, inasmuch as the waste water is usually uniform during each 24-hour period.

On the other hand, color and oxygen consumed, to a certain extent, are independent of the reaction of the water and, consequently, in this case the information provided by a composite sample should be adequate.

It will be noted that the lime consumption does not run parallel with the acidity of the mixed waste waters. The reason for this is that lime consumption, to a considerable extent, is dependent on the sulfonate concentration; i.e., the color of the waste water and the need for lime for precipitating the sulfonates and for reducing the color are indicated by the correlation of color of the process waste water and lime consumption.

Usually, addition of an amount of lime to give a pH of 7 in the neutralizing tank is sufficient to obtain a lime precipitate which will settle rapidly. However, in some cases—especially at high concentrations of sulfonates in the water—it is necessary to raise the pH to 8.4. An excess of lime above that required for neutralization is also useful in case of a large amount of emulsified oil, inasmuch as the heavier precipitate absorbs the oil.

The fact that the waste-water properties are usually uniform for about 24 hours makes it possible to operate the plant with only one full-time operator, for the reason that the control setting made at the end of the day shift usually needs only minor adjustments during the following 16 hours. These adjustments are made by operators of nearby plant unit.

To make this operating schedule possible, it was necessary to increase the hopper capacity to 7,500 lb. of one of the lime feeders from the original capacity of 650 lb. With the increased hopper capacity, the full-time operator can fill the lime feeder and make the necessary settings so that the part-time operators only need to check the effluent quality and make minor changes in the lime-feed rate. The extension of the hopper was carried out by the refinery staff.

It should be noted that the volume of waste water listed as "plant throughput" in Table 2 does not include any dilution by storm water except for the November data, inasmuch as the storm-water pumping station was only completed in the last part of October 1950. However, the data do include an average of 282,000 gal. per month of storm-water runoff from an abandoned acid-sludge pond.

Reference

1. H. Schindler, Petroleum Refiner, 28 (10) 153 (1949).

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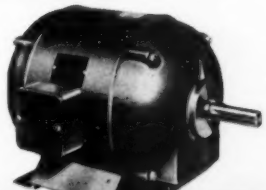

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6. Tubing Failure

(Figs. 14 and 15)

(Continued from page 80)

A STRING of 2⅜-in. tubing was pulled out of a well in South Louisiana after 3 years' service. One length came out with a bulged section below the upset (Fig. 14). It was fractured only halfway around and the crew broke it off completely.

The appearance of the inside at the break can be seen in Fig. 15. This was the heat runout point prior to upsetting. A severe localized attack of ringworm corrosion had taken place. This is not too unusual a phenomenon as it can occur in pipe not normalized after upsetting. However, it occurs only occasionally. It is due to a difference in electro-potential between the two grain structures which meet at the heat runout.

The deduction as to what caused the peculiar bulge was that the flow up the tubing washed away the products of corrosion as they were forming and thinned the wall considerably, as seen in Fig. 15. The string had been dropped a number of times and the shock load started the bulge.

THE AUTHOR

D. C. Neely, with Spang-Chalfant Division of National Supply Co., Tulsa, is a native of Economy, Pa. He graduated from University of Pittsburgh with a B.S. degree in mechanical engineering in 1931, and began working with Spang-Chalfant in 1934. He spent 3 years in various departments of the seamless-pipe mill, and was transferred to the field as an engineer in 1937, with headquarters in Houston. From this point several trips were made to the oil-producing countries of South America, and the Bahamas. Neely was transferred to Tulsa in 1950. This paper was presented at the Rocky Mountain District A.P.I. meeting in Casper, Wyo.

Fig. 14—(Right) Corrosion failure at heat runout point in upset tubing.

Fig. 15—(Below) Interior of tubing shown in Fig. 14.

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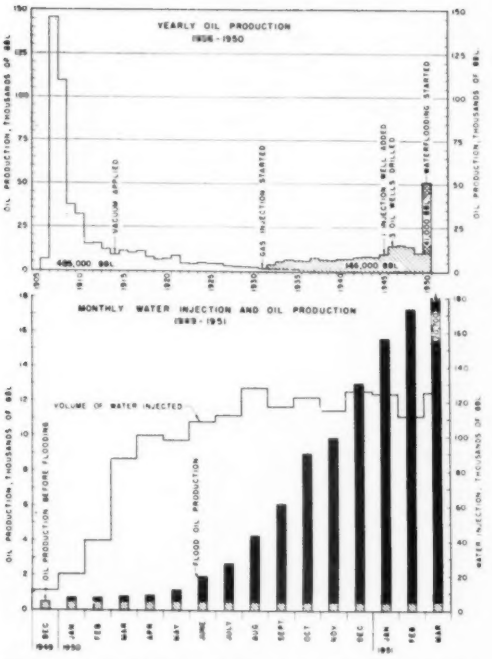

Fig. 1—Production history of Sunray Oil Corp. White-Barrett project, 33-27n-13e, Weber pool, Washington County, Oklahoma.

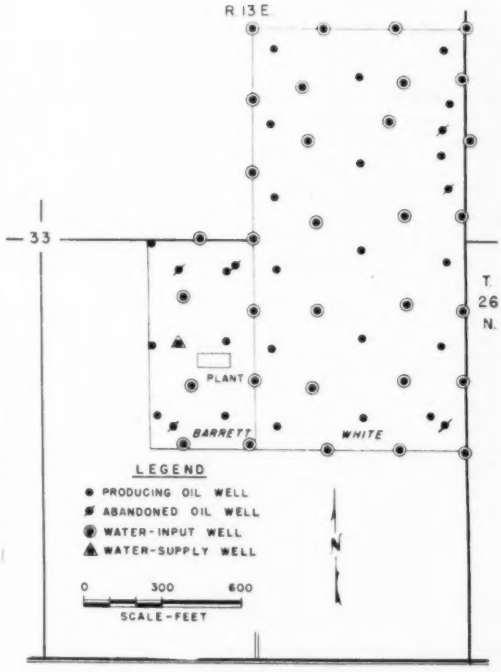

Fig. 2—Sunray Oil Corp. White-Barrett project, Weber pool, Washington County, Oklahoma, March 1, 1951.

WATER-FLOOD OIL RECOVERY

in Washington County, Oklahoma

1. Sunray Oil Corp. White-Barrett Project

by C. H. Riggs* and William C. Smith*

THE Sunray Oil Corp. White-Barrett project includes the 80-acre White and the 20-acre Barrett leases in the east half of 33-27n-13e. It is in the south-central part of Weber pool, about 4 miles northeast of Bartlesville, Okla.

Production is obtained from the Bartlesville sand which in this area is at an average depth of 1,230 ft. Thickness of the portion of the Bartlesville sand suitable for water flooding averages 32.2 ft. Sixteen wells in this area were cored. From analyses of these cores the average porosity of the sand was calculated to be about 20 per cent, the average permeability of the sand 60 md., and the average

*Petroleum engineer, U. S. Bureau of Mines Petroleum Experiment Station, Bartlesville, Okla.

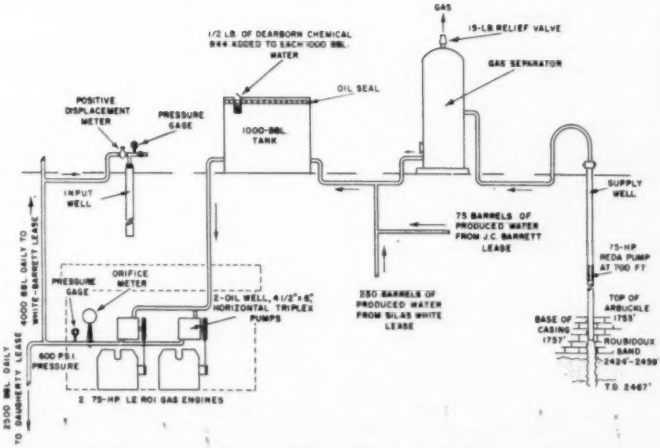
GAS
15-LB. RELIEF VALVE
1/2 LB. OF DEARBORN CHEMICAL 844 ADDED TO EACH 1000 BBL. WATER
GAS SEPARATOR
OIL SEAL
POSITIVE DISPLACEMENT METER
PRESSURE GAGE
1000-BBL. TANK
INPUT WELL
SUPPLY WELL
75 BARRELS OF PRODUCED WATER FROM J.C. BARRETT LEASE
75-HP REDA PUMP AT 700 FT.
ORIFICE METER
PRESSURE GAGE
2-OIL WELL, 4 1/2"x6" HORIZONTAL TRIPLEX PUMPS
250 BARRELS OF PRODUCED WATER FROM SILAS WHITE LEASE
TOP OF ARBUCKLE 1755'
BASE OF CASING 1757'
ROUBIDOUX SAND 2424'-2459'
TD 2467'
4000 BBL. DAILY TO WHITE-BARRETT LEASE
2500 BBL. DAILY TO BARRETT LEASE
600 PSI PRESSURE
2 75-HP LE ROI GAS ENGINES

Fig. 3—Sunray Oil Corp. White-Barrett project water plant, closed system.

oil and water saturation 36 and 44 per cent, respectively. Laboratory flood-pot tests indicate that half of the oil, equivalent to approximately 280 bbl. per acre-foot, is recoverable by water flooding.

Production history of properties.—The White and Barrett leases were developed in 1906 and the rate of oil production reached a peak of 147,000 bbl. per year in 1907. Vacuum was applied to the casing heads of the wells in 1914 and its application resulted in the production of increased quantities of oil, which is shown by the flattening of the production-decline curve (Fig. 1). Had primary and vacuum oil-production methods been continued to an economic limit (about 1935) approximately 485,000 bbl. of oil would have been recovered. In 1931, however, one oil well was converted for use as a gas-injection well and approximately 26,000 cu. ft. of gas daily was injected into the producing formation. Almost immediately the rate of oil production began to increase.

In 1945 a new gas-injection well was drilled, and in 1946 three new oil wells were completed. The increased oil production from these new wells is included as part of the increase due to gas injection. It is estimated that 146,000 bbl. of additional oil equivalent to 1,460 bbl. per acre, was gained between 1932 and 1950 inclusive, as a result of gas injection and the drilling of the new wells.

Development by water drive.—In July 1949 a permit was granted to the former Barnsdall Oil Co. (now merged with Sunray Oil Corp.) to water flood 100 acres comprising the White and Barrett leases. Drilling of the input wells was started in May 1949. Thirty-two new wells to serve as water-input wells were drilled on an irregular five-spot pattern with like wells about 440 ft. apart. The input wells were completed with 2-in. tubing set on a 7-in. shoe at the top of the oil sand and cemented with 15 sacks of cement. Seventeen old wells, including the two gas-injection wells which were converted to oil wells, are used for oil production. Six new oil wells have been drilled. The old producing wells were shot originally but new producing and input wells were not shot. The new oil-producing wells are cased with 7-in. casing cemented on top of the oil sand.

Water supply.—Water for flooding is obtained from a supply well drilled into the Roubidoux sand section of the Arbuckle limestone to a depth of 2,467 ft. The well is cased with 7-in. casing cemented at 1,757 ft. 4 ft. below the top of the Arbuckle limestone. A 75-hp. Reda pump set at a depth of 700 ft. supplies approximately 6,500 bbl. of water daily.

From the supply well the water goes through a gas separator to remove dissolved gas and then it is piped to a 1,000-bbl. treating tank. A float valve in the treating tank actuates the pump to maintain a constant water level.

An oil seal is maintained on top of the water in the treating tank and the water is handled throughout in a closed system to maintain stability of dissolved minerals and to minimize corrosion. Three and one-half to four pounds daily of Dearborn Chemical 844 are added to the water in the treating tank as an aid in minimizing corrosion. Approximately 325 bbl. daily of produced water enters the system at the treating tank.

Treated water is pumped into the injection line at a pressure of 600 psi. by two "Oil Well" 4½ by 6-in. horizontal triplex pumps powered by two 75 hp. Le Roi gas engines. The total volume of injected water is measured by an orifice meter in the pump house. The volume of water to each input well is controlled and measured at the individual well heads. Fig. 3 shows a flow diagram of the water-treating and injection system.

Water Injection

Water injection was started into 27 wells on the White and Barrett leases in December 1949, but injection was irregular until February 1950, when all 32 input wells were placed in operation. During this initial period all but one well took 30 to 130 bbl. of water daily at no injection pressure. In May 1950 the injection pressure at four of the wells increased as the void spaces in the sand began to fill up and offer more resistance to flow. During the next few months the rate of injection was gradually increased from an average of 100 bbl. of water per well daily to 128 bbl. per well daily, and pressures on some wells increase to as much as 120 psi. In March 1951 approximately 4,200 bbl. of water daily was being injected into 32 input wells at pressures ranging from 0 to 500 psi.

When water injection was started in December 1949, the 16 oil wells on the 2 leases produced approximately 18 bbl. of oil daily. The rate of oil production began to increase slightly in January 1950, but increased rapidly after June 1950 (Fig. 1). By March 1951, the rate of oil production had increased to approximately 20,700 bbl. monthly, or about 670 bbl. per day. The volume of water produced daily had increased from about 150 bbl. in 1950 to approximately 325 bbl. in March 1951.

By April 1, 1951, 1,594,825 bbl. of water had been injected into the two leases and 105,207 bbl. of oil had been produced since water injection was started. It is estimated that by production methods used just prior to water flooding, about 8,000 bbl. of oil would have been produced during this period, so 92,207 bbl. of oil had been gained as a result of water flooding. The ratio of water injected to gained oil produced is 17.3.

(This paper is one of five prepared under auspices of the U. S. Bureau of Mines Petroleum Experiment Station at Bartlesville, Okla. Facilities described here were inspected recently during a joint tour by the Kansas-Oklahoma Water-Flood Operators, Kansas Section, A.I.M.E., and Northeast Oklahoma oil producers. Other articles on water-flood projects covered on the tour will appear in forthcoming issues of the Journal.)

Mechanical Sampling Of Fuel Gases

(Continued from page 91)

was no flow of gas into the container during the period such temperature conditions existed.

Later, in an attempt to reduce the effect of extreme ambient temperature changes, the gas-sample container was housed in an insulated box placed above ground. With the container thus shielded, a maximum ambient temperature change of 38° F. resulted in a maximum change of 24° F. in the temperature of the gas within the gas-sample container.

Additional field tests are being conducted to determine the practicability of aboveground insulation of the sample container such as the use of better insulating materials and additional protection of the container from wind and the direct sun rays.

Even though the operating conditions are unusually severe, there has been no mechanical failure of any part of the sampling mechanism and from a consideration of practical conditions it is reasonable to believe that the use of a noninsulated sample container will result in the accumulation of a sample of gas that is commensurate to that obtained by the manual method of gas sampling.

In a special case in which it may be necesary or desirable to maintain a reasonably constant flow of gas into the gas-sample container, independent of changes in atmospheric temperature, probably the most practical method consists of placing the container in a housing below ground level. As a general rule, the average ground temperature does not vary an appreciable amount over a period of a week or 10 days regardless of extreme variation in ambient temperature over that same period.

The regulator and drive mechanism used in these field tests samples gas at a rate such that there is maintained approximately 9 psig. daily total increase in the pressure of gas within the gas-sample container. A typical chart record of the pressure change within the gas-sample container covering a period of 7 days is shown in Fig. 3.

BOOKS

FRESH WATER PROTECTION FROM POLLUTION ARISING IN THE OIL FIELDS. By Ogden S. Jones. Published by University of Kansas Publications, Lawrence. 132 pp.

This booklet was prepared for the convenience of the oil industry, the county attorneys of the oil counties, and the land owners in the oil areas. The material presented pertains to the work of the oil-field section of the division of sanitation of the Kansas State Board of Health. The work of this section is primarily devoted to the control and abatement of various types of pollution originating in oil fields which, if uncontrolled, offer a serious threat to both the surface streams and to the ground waters of the areas involved.

CORROSION and its control

Full Protection of Coated Lines With Magnesium

ALL of the advantages possessed by magnesium anodes as a form of energy for cathodic protection stem from the one characteristic—that of being essentially packaged energy in small units, capable of independent operation, free from dependence upon other sources of power, and thus extremely flexible in application. The advantages which accrue from this characteristic are: (1) the current drainage may be distributed nonuniformly along a line, to meet nonuniform demand; (2) even when the demand is uniform, distributed drainage affords full cathodic protection to a line with lower total current; (3) protection may be applied without reference to the location of power lines; (4) the simpler installations involved do not ordinarily require right-of-way or easements; (5) the design of a cathodic protection system may be modified in the field, to fit unanticipated conditions; and (6) current drainage may be increased locally to meet unexpected increases in demand.

Among the disadvantages of this method of protection may be listed: (1) higher cost per ampere-hour [but this is in many cases offset by number (2), above]; (2) anodes will not operate at satisfactory current ratings except in soil of low and medium resistivity, and there is no way to step up the voltage, as can be done with rectifiers; (3) current output falls off during prolonged dry spells, with attendant loss of protection; (4) the more widely scattered installations, essentially flimsy, are more subject to damage, and supervision and maintenance are more difficult.

A careful weighing of the advantages and disadvantages will lead to the adoption of this system of cathodic protection for many pipe lines. The technique of applying "hot spot" protection to bare lines has been discussed (Installment 11), and the present discussion will be limited to the application of complete protection to coated pipe lines. Complete protection can be assumed to be achieved when every point on the line is at a potential of 0.85 volts negative, or more, referred to a copper-copper sulfate electrode.

A preliminary estimate of current requirements is made, either by using an assumed value for the effective bare area of the pipe (2 per cent bare is a reasonable figure for good coating applied by the best modern techniques) and the conservative value of 2 ma. per sq. ft. of effective bare pipe metal; or may be based on current requirement tests run in the field.

The next step is the installation of part of the estimated quantity of magnesium, distributed as uniformly as soil conditions will permit along the line. The percentage of the estimated requirement installed at this stage depends entirely upon the confidence felt in the accuracy of the estimate—it may range from 50 to 100 per cent.

The more experience the engineer has, and the more reliable the data on which the estimate is based, the more confidently can he proceed with the project as estimated. Assuming that a 10-year life is desired, care should be taken that at each station the size of anode chosen, and the number installed, are such that the 10-year rating can be obtained; current output per anode at this early stage should be at least 50 per cent above the value expected to be reached in the final stage, for the current will drop as the line potential rises.

Allow Polarization Time

After this initial installation, the anodes should be allowed to operate for a period of 3 weeks or more, to allow time for complete polarization of the line. If the quantity initially installed is adequate, complete polarization will be reached and protective potentials will be achieved throughout the length of the line. If, however, the amount is inadequate, it will be comparatively simple to determine how much more is needed, and where.

Additions may be made to existing stations, or new stations may be required at intermediate points. In making additions to stations already established, a narrower margin of current in excess of the rating may be used, since there will be a smaller proportional shift in potential following such additions.

This process is continued until the entire line has been brought to the protective potential of 0.85 volts. This must be achieved with all of the anodes operating at or slightly below the current rating corresponding to 10-year life (or whatever value has been chosen). Anodes whose outputs are below their rated values will, of course, be expected to last longer than 10 years; anodes which discharge current in excess of their ratings will have to be restrained by the insertion of resistors in the leads. It is not customary to regulate the individual anodes in this manner, but rather to use a single resistor for a group. If the amount by which the current is thus reduced is very great, it may be necsary to add a few anodes in order to maintain potentials at a satisfactory level.

Connection to the pipe itself may be made by the Cadweld (thermite) process, using No. 12 or No. 10 solid copper wire with direct burial insulation (type TW or similar). This connection should be well protected with coating material which is compatible with that on the line, to eliminate any chance of galvanic action between the bronze of the weld and the steel of the pipe—an event more likely to occur if the lead is accidentally broken, rendering the station inoperative.

The lead from the pipe, and the collector wire from the anodes, may be brought up aboveground in a marker of 2-in. pipe; in this marker the connections will be made, including the resistor to regulate current output. This resistor can be made of Chromel wire (No. 16 or No. 20), the length being determined by trial. It is very useful to include in the circuit a shunt of 0.01 ohm value, by means of which the current can be measured with a potentiometer, without opening the circuit.

No mechanical connectors should be used, since these will almost certainly develop resistance before 10 years have passed. Silver soldering is a very good method of making these connections, as well as those by which the individual anode leads are joined to the collector wire—if silver solder is used, these may be buried directly without taping. Chromel wire cannot be soldered with ordinary lead-tin solders, at any rate, and the same silver solder used here can well be used for all the joints.

Part 13 of a series by Marshall E. Parker, consulting engineer, Houston.

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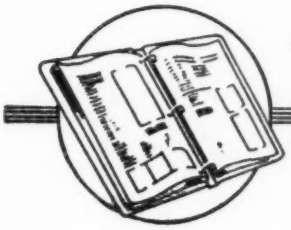


THE REFINER'S notebook

No. 73

New Method for Determination of Cloud Point of Dark Diesel Oil

by Dr. Y. C. Young*

Part I—Principle and Apparatus Used

MANY diesel oils are too dark to come within the transparency range of the standard cloud-point test (A.S.T.M. Standard D97-47). A new, simple method, which requires no special equipment, has been proposed to overcome this difficulty.

The principle of this method is based upon the fact that during cooling, as soon as any precipitation or separation occurs in the oil, its viscosity will be abnormally influenced. This abnormal change is taken as an indication that the corresponding temperature is the cloud point of the oil.

Testing may be carried out in any type of capillary viscosimeter. The author prefers the use of Vogel-Ossag viscosimeter[1] because it is quicker and easier for the control of the testing temperature, and gives accurate results in a comparatively short time. This test is applicable to any kind of diesel oil and its like, irrespective of whether it is dark or transparent.

The general features of the Vogel-Ossag viscosimeter (Fig. 1) are as follows: The capillary of the viscosimeter is cemented into a metal sleeve which screws into the cap of the oil reservoir, into which a thermometer is dipped for measuring temperature of the oil during testing. To the top of the capillary a glass hand-operated suction pump is connected for sucking up the oil when making tests.

The whole apparatus is immersed in an unsilvered Dewar flask containing alcohol with solid carbon dioxide added intermittently as a cooling medium. Temperature of the alcohol is generally kept equal to, and not over 0.1° C. lower than, the testing temperature.

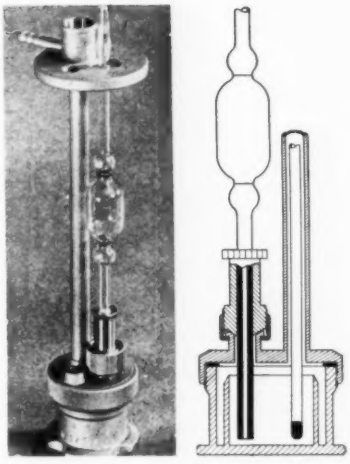


Fig. 1—Vogel-Ossag viscosimeter.

By raising and lowering the level of the oil in the capillary, the temperature required for testing may be quickly arrived at and maintained constant. Time of flow of a definite amount of oil from the upper mark down to the lower mark on the capillary, multiplied by the capillary constant, gives the viscosity of the oil. Tests may be made at successive temperatures without disturbing the apparatus.

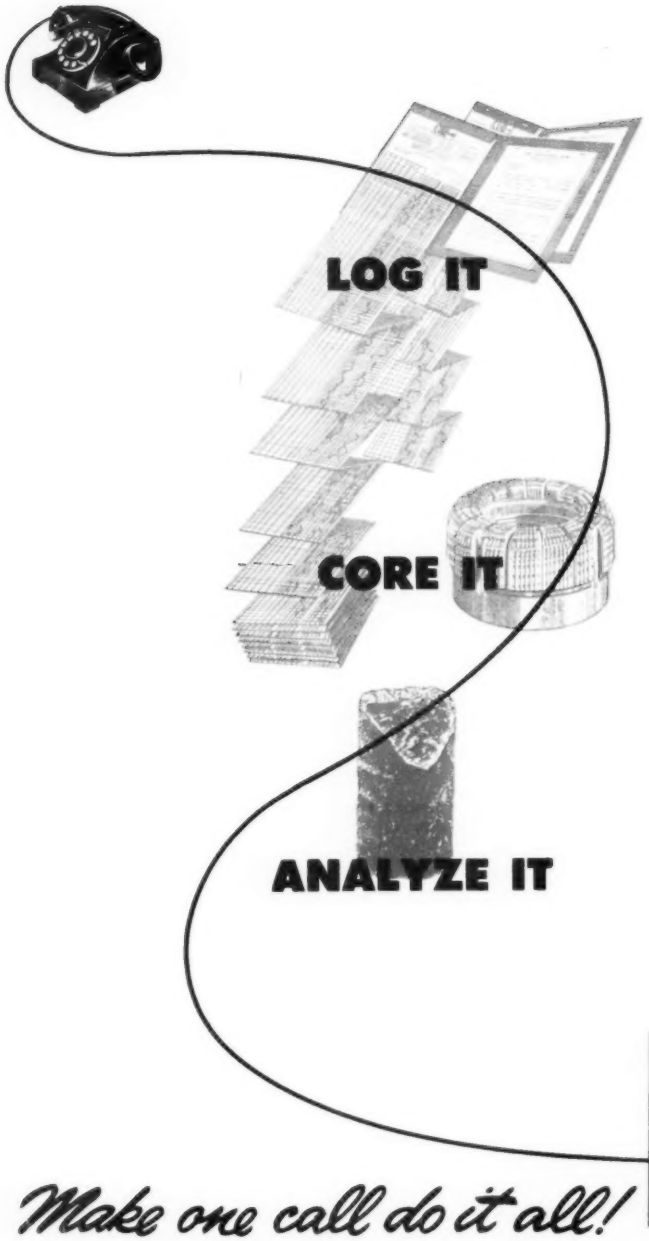
(This is the first installment dealing with a new method for determination of cloud point of dark diesel oil. In the second and concluding part, which will appear next week, the procedure followed in making the actual determination will be discussed.)

TABLE I—DETERMINATION OF THE CLOUD POINT OF VARIOUS DIESEL OILS BY MEANS OF CAPILLARY VISCOSIMETER

Testing temp. (°C.)	Time of flow in viscosimeter.* Test No. 1 Min.-Sec.	2 Min.-Sec.	3 Min.-Sec.	4 Min.-Sec.	Cloud point (°C.)
	Fischer-Tropsch Synthesis				
+10	0 30.3	0 30.3	0 30.3	0 30.3	....
+ 4	0 35.3	0 35.3	0 35.3	0 35.3	....
+ 2	0 37.3	0 37.3	0 37.3	0 37.3	....
+ 1.5	0 44.0	0 44.4	0 43.4	0 42.3	+1.5
+ 1	(Capillary stopped by precipitate)				
	Petroleum				
0	1 9.1	1 9.1	1 9.1	1 9.1	....
— 7	1 33.4	1 33.4	1 33.4	1 33.4	....
— 8	1 38.0	1 38.0	1 38.0	1 38.0	....
— 9	2 2.7	2 2.2	2 2.0	2 1.8	—9
—10	2 35.6	2 28.2	2 26.1	....	....
+ 4	1 5.9	1 5.9	1 5.9	1 5.9	....
— 5	1 34.6	1 34.6	1 34.6	1 34.6	....
— 6	1 39.9	1 40.1	1 40.6	1 40.8	—6
— 7.5	2 5.5	2 6.5	2 6.3	....	....
—15	1 11.8	1 11.8	1 11.8	1 11.8	....
—20	1 29.9	1 29.9	1 29.9	1 29.9	....
—23	1 45.4	1 45.4	1 45.4	1 45.4	....
—24	1 57.2	1 56.2	1 55.6	1 55.0	—24
—25	2 15.2	2 11.1	2 8.4	2 6.6	....

*The Vogel-Ossag viscosimeter used has a capillary constant k = 0.158.

*The experimental work was carried out in the Institut fuer Mineraloelund Braunkohlenforschung an der Technischen Hochschule, Berlin, Germany.



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Reservoir Voidage

IN working any reservoir problem a balance on volumes is necessary. This is, in fact, the entire basis of material-balance considerations. Sometimes, however, the simplicity of reservoir-voidage considerations is obscured by the more complex considerations of reservoir predictions, and a brief consideration of volume balances can clarify the qualitative picture.

Consider, for example, a solution-gas-drive reservoir. As a rule of thumb it may be stated that the residual gas saturation will be substantially a constant at approximately 30 per cent of the pore space when the reservoir is depleted. Take the reservoir of Fig. 1, with 30 per cent connate water and 70 per cent original oil content. If this oil had a formation volume factor of 1.75, at residual conditions it would occupy 40 per cent of the pore space. If no water were produced during the interval this would then just satisfy 30 per cent gas residual, a condition which would mean that no oil could have been produced. Obviously the rule of thumb approaches an absurdity in this instance.

Another rule of thumb may be that the recovery for a solution-drive reservoir is 30 per cent. In this instance $.70/\beta_i \times .30$ would be the loss in oil saturation, where β_i is the initial formation volume factor. The residual gas saturation, assuming no water movement would be

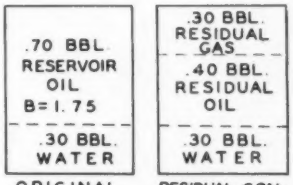
.70 BBL. RESERVOIR OIL B=1.75
.30 BBL. WATER
ORIGINAL RESERVOIR
.30 BBL. RESIDUAL GAS
.40 BBL. RESIDUAL OIL
.30 BBL. WATER
RESIDUAL CONDITIONS OBTAINED MERELY BY SHRINKING OIL. PRODUCTION WOULD BE ZERO.

Fig. 1

$$.70 - .70/\beta_i \times .30$$

Thus, if β_i were as low as 1.0 the gas residual saturation would be required to be 49 per cent, and if β_i were as high as 2.0, the gas residual saturation would be required to be 69.5 per cent.

Thus, a consideration of space voidage indicates that absurd results may sometimes be found by adhering to rule-of-thumb estimates, or indicates in what direction a rule-of-thumb estimate should be changed. In any case terminal space voidage calculations can give limits from which to work. Mathematically, this can be expressed in terms of saturations. The sum of the initial reservoir saturations must be one and the sum of the final reservoir saturations must be one.

$$S_{oi} + S_{wi} + S_{gi} = 1.0$$

and

$$S_{or} + S_{wr} + S_{gr} = 1.0$$

or

$$S_{oi} + S_{wi} + S_{gi} = S_{or} + S_{wr} + S_{gr} \qquad (1)$$

For the special case of no water movement, and without considering shrinkage of water volume due to gas liberation or expansion due to release of pressure this becomes

$$S_{oi} + S_{gi} = S_{or} + S_{gr} \qquad (2)$$

For the more special case of no original free gas this is

$$S_{oi} = S_{or} + S_{gr} \qquad (3)$$

However, S_{or} has as limits S_{oi}/β_i and 0.0. Therefore, S_{gr} has as limits $S_{oi}(1 - 1/\beta_i)$ and S_{oi}. Thus, in the reservoir chosen to have 70 per cent oil saturation with a formation volume factor of 1.5 the limits on residual oil at atmospheric would be $.70/1.5 = 46.6$ per cent and 0. The limits on residual gas would be 23.3 and 70 per cent.

Of course, S_{oi} and S_{or} are related by the production such that $S_{oi}/\beta_i - S_{or}$ equals stock-tank production in per cent of pore space. Therefore, the relation between residual gas, residual oil and production is found by substitution in Equation 3.

$$(\text{Per cent prod.} + S_{or})\,\beta_i = S_{or} + S_{gr}$$

$$\text{Per cent prod.} = S_{or}\,\frac{(1 - \beta_i)}{\beta_i} + S_{gr}/\beta_i \qquad (4)$$

For a given value of β_i this relates per cent production, residual oil and residual gas. This relation holds regardless of the amount of connate water, assuming only that the connate water value remains constant. Fig. 2 shows the variation of Equation 4 for value of β_i equal to 1.5, and Fig. 3 for a value of β_i equal to 1.2. The nature of Equation 4 is such that for a given value of β_i and S_{gr} the relation between S_{or} and per cent production is linear.

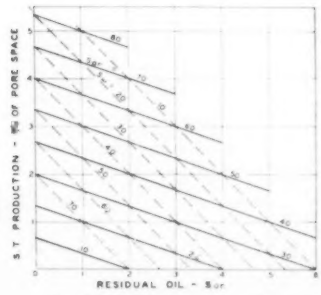

Fig. 2—Equation 4 for $\beta_i = 1.5$.

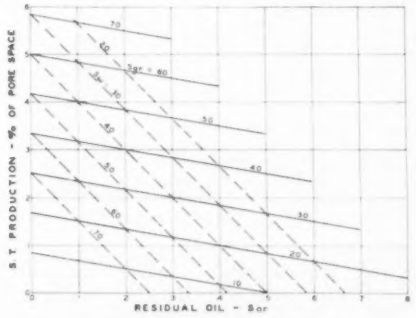

Fig. 3—Equation 4 for $\beta_i = 1.2$.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, Penn State College

FLUOR-GR "TRUSS-TYPE" FIN-FANS

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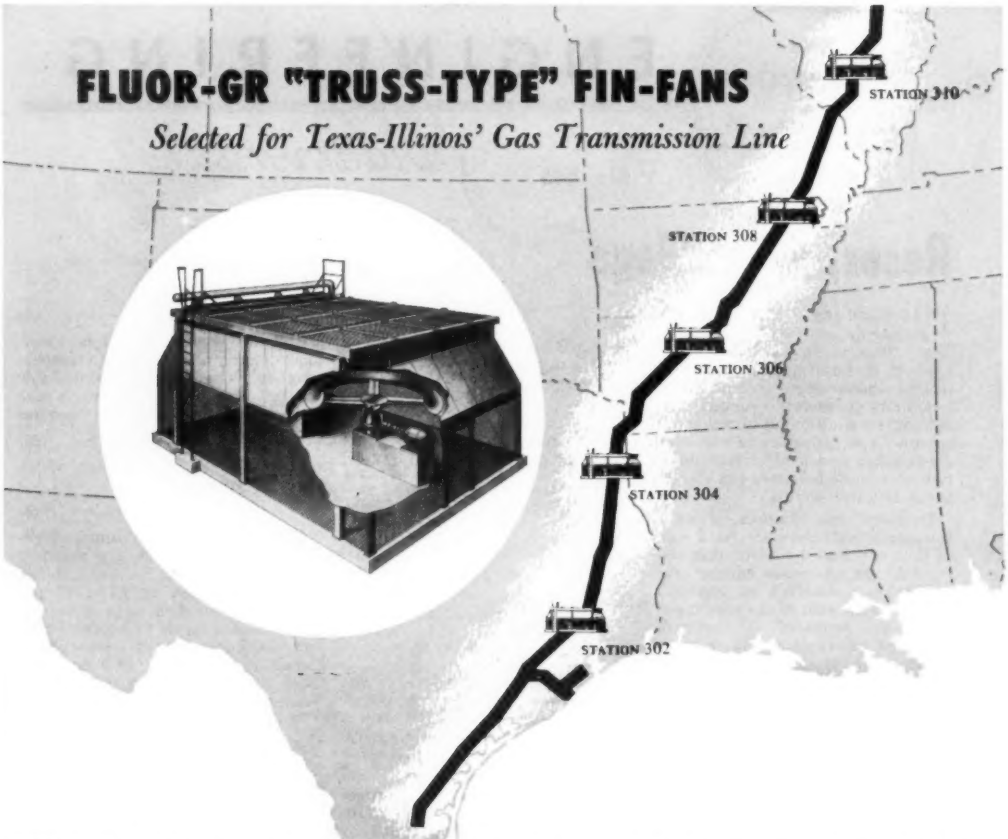

FIN-FANS *handle all jacket water and lube oil water cooling*

The initial five stations on the Texas-Illinois Natural Gas Pipeline Company's 1200-mile, 30-inch gas transmission line are equipped with Fluor's new "Truss-Type" Air-Cooled Heat Exchangers. In addition to economy and dependability of operation, these new "Truss-Type" Fin-Fans are designed for low-cost extension by utilizing end columns of existing units as an integral part of future extensions. When greater cooling capacity is desired, it is only necessary to add to the existing installation—time and space requirements are minimized and the extension can be made without disturbing plant operation.

This new Texas-Illinois line is another major gas transmission system to select Fluor-GR Air-Cooled Heat Exchanger Equipment for compressor station jacket water and lube oil water cooling service. The Fluor Corporation, Ltd., and The Griscom-Russell Company pioneered the use of air-cooled heat exchangers in gas transmission, and remain the leaders in the design and fabrication of such equipment for the cooling of liquids and gases and the condensing of vapors.

The accumulated experience of both Fluor and Griscom-Russell is available to you for your present and future heat transfer problems by contacting any Fluor office. In the meantime, why not send for Fluor Bulletin No. FF 8501 for your files?

FLUOR PULSATION DAMPENERS INSTALLED FOR BOTH SUCTION AND DISCHARGE

To reduce gas stream pulsations and attendant vibration, Fluor Pulsation Dampeners are installed for both suction and discharge service in four of the five Texas-Illinois Natural Gas Pipeline Company's compressor stations.

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NATURAL GAS

Gas Insurance

Group endorses program for improving supplies

COLUMBUS.—A committee on natural-gas problems representing seven states has devised a plan at a meeting here which is intended to improve supply and distribution of gas in the Appalachian area served by Columbia Gas System, Inc., and its subsidiaries.

Ohio, Maryland, Virginia, New York, Kentucky, Pennsylvania, and West Virginia plus the District of Columbia were represented.

Program. — The committee's solution called for the Petroleum Administration for Defense to allocate materials necessary for completion of Texas Eastern Transmission Corp.'s facilities already authorized by the Federal Power Commission and for expansion of underground storage facilities by Applachian Utilities. The Texas Eastern line would bring about 100,000,000 cu. ft. of gas per day into Ohio.

The program also seeks:

1. Favorable action by FPC on Texas Gas Transmission Corp.'s application for additional facilities.

2. Reassurance from Columbia that the system will not voluntarily extend natural-gas service to any new markets during 1951, and will oppose any applications by others before the FPC seeking extension of service.

3. Commitments from FPC that the agency will not approve any applications seeking new service from Columbia or subsidiaries, or those submitted by pipe-line companies in the United States seeking to export gas.

4. Also assurance from state commissions and FPC to minimize if not prohibit sale of natural gas for off-peak or summer industrial loads where distributing utilities with underground or other storage facilities can show that such gas can be utilized in storage operations for the improvement of the natural-gas supply for all classes of customers during ensuing winter periods.

The program was to be submitted to the Federal Power Commission.

Phillips Hearings End; Both Sides to File Briefs

BARTLESVILLE, Okla.—The Federal Power Commission hearing held here to determine the status of Phillips Petroleum Co. under the Natural Gas Act came to an end last week.

Questions of attorneys and answers of witnesses during the 39 days of testimony filled nearly 6,000 pages.

Attorneys for both sides agreed to dispense with an intermediate report by FPC Examiner Edward A. Marsh who presided at the trial. Marsh will send the record directly to the commission in Washington.

Both sides will file briefs with the commission by June 22, and replies by July 6. The commission later will fix a date for oral argument.

The hearings were concerned with Phillips' sales of natural gas to interstate pipe-line firms which in turn sell to cities in the West and North. Wisconsin and several cities, alleging excessively high rates, were intervenors on the side of the government, while the Texas Railroad Commission intervened in support of the Phillips side.

Tennessee Gas Deliveries Climb to 1,031,676 M.c.f.

HOUSTON. — Average daily deliveries of gas by Tennessee Gas Transmission Co. climbed to 1,031,676 M.c.f. during the first quarter of this year, 40 per cent higher than the respective quarter during 1950.

Construction.—Tennessee's 1951 expansion program is well underway, according to Gardiner Symonds, president. The program includes the laying of 794 miles of main-line pipe, including a 303-mile extension of the main line from Buffalo, N. Y., to the New York - Massachusetts state line plus the addition of 54,500 hp. in compressors. When completed the expansion will bring the system capacity to 1,200,000 M.c.f. per day.

Symonds said that the additional capacity would serve the major requirements of Northeastern Gas Transmission Co., Tennessee subsidiary, which will provide New England with its first natural-gas service this fall. Some of the capacity will be required for additional demands on the present system.

Tennessee has been seeking expansion of capacity to 1,395,000 M.c.f. per day, and in a joint application with United Natural Gas Co., has asked permission to establish underground-storage facilities in northern Pennsylvania to increase peak day deliverability by 200,000 M.c.f.

Elk City Cycling Plant To Be Dedicated June 7

Shell Oil Co. has announced that the new Elk City field gas-processing and cycling plant, owned jointly by nine oil companies, will be formally dedicated June 7.

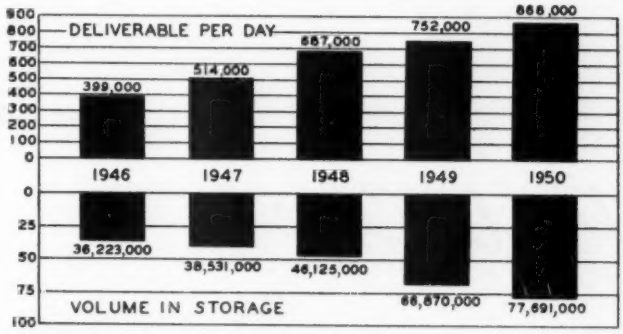
The plant has a design capacity of 100,000,000 cu. ft. of gas daily, and handles both oil and gas produced from wells in Elk City Unit area, which includes 106 40-acre tracts.

The plant is presently producing about 4,525 bbl. daily of natural gasoline and butane, and about 835 bbl. of propane. It is returning about 75,000,000 cu. ft. of gas daily to the producing formation.

Sulfur Plant Planned

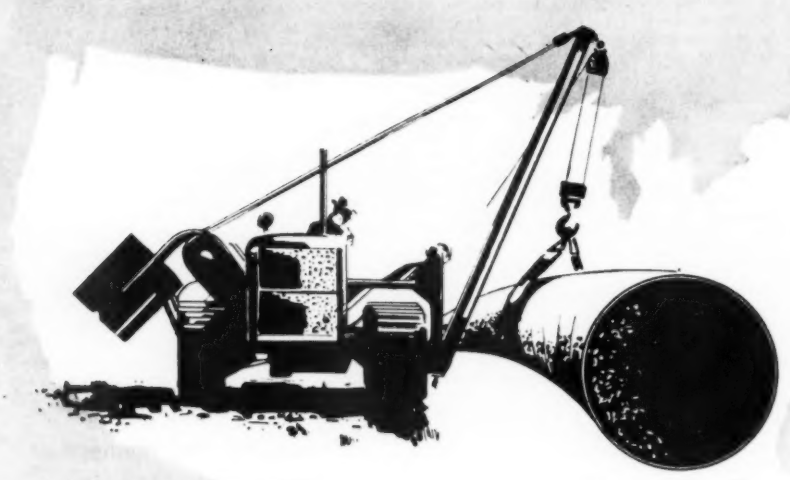
BARTLESVILLE, Okla. — Phillips Chemical Co. has announced plans to build a sulfur-extraction plant near Goldsmith, Tex., in the Permian basin.

The plant is designed to extract about 250,000 lb. of elemental sulfur per day from natural gas. Output will be used by the company in connection with its ammonium fertilizer plant at Adams Terminal near Houston.



***STORAGE GROWTH.**—Typical of growth of underground storage facilities of major natural-gas companies in the United States is the expansion of daily deliverability and volumes of natural gas stored underground by Consolidated Natural Gas Co. from 1946 to 1950 inclusive, charted above. Bar-chart figures are in M.c.f. and tabulated as of December 31 of each year.*

OUT WHERE THE GOING'S TOUGH



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PIPE LINES

Pipe-Line Plan

El Paso to use gas turbines in intermediate stations

BAKERSFIELD, Calif. — How El Paso Natural Gas Co. plans to use gas turbine-driven centrifugal compressors in new intermediate stations on its Texas-Arizona transmission system was described by the company's assistant chief engineer, C. L. Moore, at the transmission conference of the Pacific Coast Gas Association here.

Moore said the company expects to increase the daily capacity of its parallel 30 and 26-in. lines by 100,000 M.c.f. in the near future.

Shortly afterward, to increase deliveries to California gas companies, an additional 200,000 M.c.f. of capacity will be added. At that time the system's capacity will be about 1,055,000 M.c.f. daily, he said.

More stations.—To secure this additional capacity El Paso Natural will add intermediate stations between existing stations, which are spaced about 100 miles apart. About 10 new stations will be required, each consisting of three centrifugal compressors driven by 5,000-r.p.m. gas turbines rated at 5,000 hp.

Use of the intermediate-station plan was decided upon after studies indicated it to be more economical than either looping or large additions at existing stations, which are powered by reciprocating units.

Efficiency-wise, Moore said the company expects to obtain about 25 per cent thermal efficiency with a regenerator capacity of approximately 80 per cent. The stations have been designed to operate with minimum personnel.

Air cooling.—Moore said it is planned to use evaporative cooling at each plant to lower the temperature of intake air to turbines during hot summer days.

He pointed out that the turbines' horsepower ability depends to a large extent upon the ambient air temperature in the air intake. Thus by using an evaporative cooler not only will any dust be washed from the intake air, but also under certain temperature and humidity conditions a net increase in horsepower will be effected.

Montana-Dakota Purchase of Western Gas Lines O.K.'d

WASHINGTON. — Montana-Dakota Utilities Co., Minneapolis, has been authorized by the Federal Power Commission to acquire natural-gas pipe-line and related facilities of three companies operating in Montana and Wyoming.

Construction of interconnections between the properties and of additional compressor stations also was authorized.

The company will purchase from Billings (Mont.) Gas Co. an 88-mile gas line from Garland, Wyo., field to Billings, 22 miles of lateral and gathering lines, a compressor station, a desulfurization and dehydration plant, and several distribution systems.

From Rocky Mountain Gas Co., Montana-Dakota will acquire 41 miles of lines to Cowley, Lovell, and Powell, Wyo., distribution systems, and a line from Garland field to Lovell.

Properties to be bought from Big Horn Gas Co., Basin, Wyo., include a 74-mile line from Little Buffalo Basin field in Hot Springs County, Wyoming, to Basin and Greybull, Wyo., and about 13 miles of lateral line in the same county.

Montana-Dakota will connect these lines with the line owned by Montana-Wyoming Gas Pipe Line Co. and operated by the former by building about 16 miles of line. The company also will build a 660-hp. compressor station and dehydration facilities in Little Buffalo Basin field.

Estimated total cost is $4,770,389 for facilities purchased. Those to be built will cost about $708,774.

FPC O.K.'s New York Line

WASHINGTON.—New York State Natural Gas Corp. has received the go-ahead from the Federal Power Commission to construct a 39-mile 20-in. natural-gas line in Pennsylvania and New York.

The line will parallel an existing line from the company's State Line compressor station in Potter County, Pennsylvania, to the boundary line between Livingston and Monroe counties, N. Y. It will deliver gas to eight utility companies whose increased requirements exceed capacity of the old line.

Cost of construction is estimated at $2,093,700.

Nebraska Gas Lines Planned

WASHINGTON.—Kansas-Nebraska Natural Gas Co., Inc., Phillipsburg, Kans., plans to construct pipe-line facilities in Nebraska and Colorado which will increase capacity of its transmission system from 164,200,000 to 182,600,000 cu. ft. per day.

The proposed construction includes 15 miles of 6⅝-in. line and 11 miles of 8⅝-in. line from Big Springs field in Deuel County, Nebraska, to Ogallala, Neb.; a 52-mile, 8⅝-in. line to

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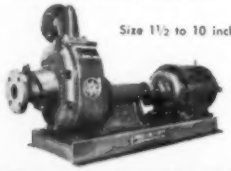

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replace the existing 4½-in. Ogallala-North Platte line; plus several lateral lines, and measuring and regulating equipment.

The company estimates facilities to cost $976,330. An application for authority to add the new lines to the company system has been placed before the Federal Power Commission.

El Paso Plans 96-Mile Line To Serve New Gas Discovery

EL PASO, Tex.—Plans for construction of about 96 miles of 20 and 24-in. natural-gas pipe line were announced here this week by C. C. Cragin, vice president and general manager, El Paso Natural Gas Co.

Construction will start as soon as pipe is available to extend the El Paso system from Benedum station in northeastern Upton County to serve a new gas field discovery in northwestern Val Verde County.

Benedum station is at the eastern terminus of El Paso's 105-mile, 30-in. lateral extending from Lea County, New Mexico. El Paso owns 5,700 acres around the new strike.

Discovery well of the new Val Verde County area is located 18 miles northeast of Juno and 3 miles south of Sutton County line. It is Reagan J. Caraway, Dallas, 1 Guida Rose, located 330 ft. from south and east lines of NE¼ Section 2, GC&SF RR Survey. The well was completed at 10,269 ft. in the Pennsylvanian.

Meanwhile, 8 miles southwest of the new gas discovery, Delta Gulf Drilling Co., Tyler, Tex., has completed arrangements with Dan Auld, Kerrville, Tex., and San Antonio operator, to take over a scheduled 11,750-ft. Ellenburger wildcat, 1 B. E. Wilson, 660 ft. from north and east lines of Section 82, Block E, GC&SF RR Survey.

Pipe-Line Briefs

Michigan-Wisconsin Pipe Line Co. has ordered a multi-channel radio relay system with continuous unattended telephone facilities and other communication services to serve its recently completed natural-gas pipe line from Hansford County, Texas, to the Michigan-Wisconsin area. The system will cover a total distance of about 1,500 miles. Federal Telephone and Radio Corp., Clifton, N. J., will manufacture and install equipment.

Pan American Pipe Line Co., Houston, has let contract for 10.5 miles of crude-gathering line in Forest Hills and Midway Lake pools in Wood County, Texas. The 8, 6, and 4-in. line will carry 1,200 bbl. daily. The company also will lay 10 miles of 8-in. loop on its Quitman-Hawkins trunk line, increasing capacity from 13,500 to 17,500 bbl. daily.

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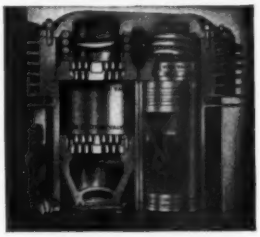

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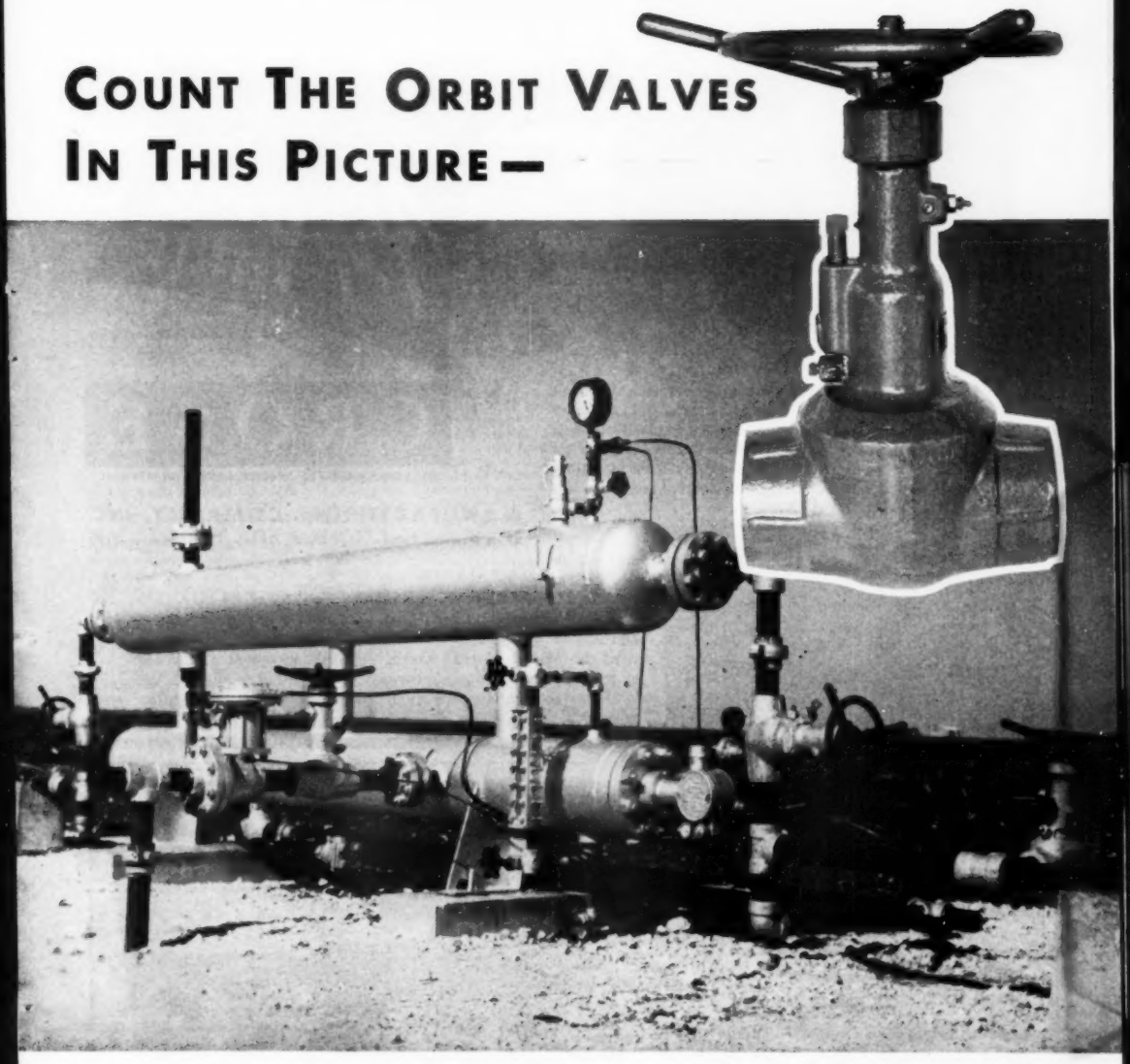

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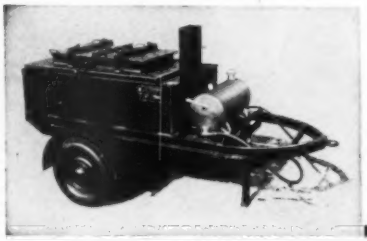

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Alberta-Vancouver Oil Pipe Line Co. (Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

General Petroleum Corp.—42 miles, 8-in., under way, San Ardo to Estero Bay, Calif.; Bechtel Corp.; San Miguel, field office; J. S. Connell and George Anderson, superintendents.

Phillips Pipe Line Co.—35 miles, 10-in.; authorized; Brownfield, Tex., to Plains, Tex.

Phillips Petroleum Co.—278 miles, 10-in., under way, Borger, Tex., to Yale, Okla.; Brown-Lite Co., Tulsa, and Arey-Phillips Construction Co., Pampa, Tex., contractors.

Phillips Pipe Line Co.—145 miles, 10-in., under way, Borger, Tex., to Clinton, Okla.; Arey-Phillips Const. Co.; Sayre, Okla., field office, H. V. Gorman, spreadman.

Phillips Pipe Line Co.—137 miles, 10-in., under way, Yale to Clinton, Okla.; Brown-Lite Co.; El Reno, Okla., field office, Carlis Gayhart, spreadman.

Phillips Pipe Line Co.—53 miles, 8-6-in., under way, Wheeler to Sweeny, Tex.; O. R. Burden Construction Co.

Phillips Pipe Line Co.—24 miles, 8-in., under way, Thrall to Kansas City, Kans.; C. H. Gragg Construction Co.

Phillips Pipe Line Co.—Proposed, Midland, Glasscock, Reagan, and Upton counties.

Platte Pipe Line Co.—1,075 miles, 16-20-in., contracted, Worland, Wyo., to Wood River refining area in Illinois. Contracted as follows: 553 miles, Chatham, Wyo., to Holdredge, Neb., R. H. Fulton & Co., (Sections 1, 2, 3, and 4—section 1, 126 mi., of 16-in.—remainder 20-in.); 142 miles, 20-in., near Marysville, Kans., to Holdredge, Nebr., Bishop & Lock. H. LaQuey, spreadman, (Section 5); to begin May 1951; 100 miles 20-in., northern edge of Kansas. Rumsey Brothers, (Section 6); 274 miles, 20-in., State of Missouri, O. R. Burden, (Sections 7 and 8).

Progress Co.—900 miles, 20-in., proposed. Permian basin, West Texas to California.

Service Pipe Line Co.—135 miles, 8-10-in., planned, Old Glory field to Bowie, Tex.

Sinclair Pipe Line Co.—700 miles, 22-in., planned; Drumright, Okla., to Chicago.

Texas-New Mexico Pipe Line Co.—75 miles, 8-in., planned, Midland to Germania pool; Midland to Scarborough and Sweetie Peck area; and Crane station to McElroy area, West Texas.

Texas-New Mexico Pipe Line Co.—55 miles, 8-in., planned, Eunice to Covington and Saunders area, New Mexico.

Texas Pipe Line Co.—56 miles, 12¾-in., Chico to Wichita Falls, Tex.; R. H. Fulton & Co., contractor; M. L. Boyd, spreadman, Henrietta, Tex.

Trans-Mountain Oil Pipeline Co. (Sponsored by Bechtel Corp.)—715 miles, under way by July 1951, Edmonton, Alta., via Yellowhead Pass to Vancouver, B. C.

West Texas Gulf Pipe Line Co.—450 miles, 26-in., authorized, Colorado City to Wortham, Tex., 26-in.; Wortham to Sour Lake, Tex., 24-in.

West Texas Gulf Pipe Line Co.—18-in., authorized, Wortham to Longview, Tex.

Products Pipe Lines

Bell Oil & Oil Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla.

Buckeye Pipe Line Co.—430 miles, 14-in., proposed, Linden, N. J., to Allentown, Pa., Junction; Chelsea, Pa., via Allentown Junction to Auburn, Rochester, Syracuse and Oswego, N. Y. Start 1952; finish 1953.

Great Lakes Pipe Line Co.—355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City Iowa, to Sioux Falls, S. D.

Great Lakes Pipe Line Co.—119 miles, 8-in.; planned; Des Moines to Iowa City.

Miami-Valley Corps.—58 miles, 8-in., under way, Dayton to Cincinnati, Ohio; Anderson Brothers Co.

Plantation Pipe Line Co.—707 miles, 14 and 18-in., contracted, Baton Rouge to Charlotte, N. C., 275 miles, 14-in., under way, Bremen to Charlotte, N. C.; 432 miles, 18-in., under way, Baton Rouge to Bremen, Ga.; 220 miles, 18-in., Baton Rouge to Mississippi-Alabama state line; Williams Brothers Co. David R. Williams, Jr., project manager, George Allen, spread superintendent, Tuscaloosa, Ala.; T. E. Davis, spread superintendent, Talledega, Ala.

Progress Co.—900 miles, 10-in., proposed, California to West Texas.

Pure Transportation Co.—100 miles, 6-in., under way, Heath to Dayton, Ohio; Wabash Construction Co.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Standard Oil Co. (Ind.).—50 miles, 8-in., under way, north of Sugar Creek, Mo., refinery; Lawhon Construction Co., Southern Mill & Mfg. Co., contractors.

Standard Oil Co. (Ind.).—144 miles, 8-in., authorized, Neodesha, Kans., to Sugar Creek, Mo.

Texas Pipe Line Co.—56 miles, 10 in., under way, Lawrenceville, Ill., to Mt. Vernon, Ind.; O. R. Burden Construction Corp., contractor; O. P. Hines, spreadman; Mt. Carmel, Ill., field office.

Triangle Pipe Line Co.—100 miles, 10-in. planned, Eldorado, Ark., to point on Mississippi River.

Tuscarora Oil Co., Ltd.—27 miles, 8-in., contracted, Pittsburgh Junction, Pa.; to Midland, Pa.; 34 miles, 10-in., contracted. Knappenberger Scraper Trap to Pittsburg Junction, Pa.; 26 miles, 10-in., contracted. Barneytown Scraper Trap to East Freedom Pa.; Pipe line Construction & Drilling Co

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—276 miles, proposed, Greenwich, Conn., to Boston area; 492 miles, proposed, laterals-New England area.

Amere Gas Utilities Co.—15 miles, 8-in., authorized, KA-8 Flat Top to Beckley, W. Va. Completion date June 1951.

Amere Gas Utilities Co.—11 miles, 8-in., authorized KA-5 loop, Priceton and Athens, W. Va. Completion date December 1951.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.).—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Carolina Natural Gas Corp.—185 miles 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Central Kentucky Natural Gas Co.—12 miles, 20-in., line E loop, Means to Foster, Ky. Completion date October 1951.

Central Kentucky Natural Gas Co.—15 miles, 20-in., Cold Spring, Ky., to Anderson's Ferry, Ohio. Completion date December 1951.

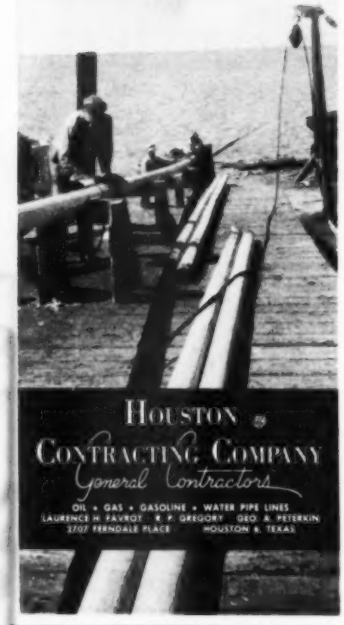
Central Kentucky Natural Gas Co.—18 miles, 12-in., Winchester to Lexington, Ky.

Cities of Booneville and Baldwin, Miss.—96 miles, ¾ and 6-in., under way, Booneville and Baldwin, Miss.; M. L. Hulcher Co., Inc., contractor, Sam Carnahan, spreadman. Completion date November 1, 1951.

Cities Service Gas Co.—29 miles, 16-in., under way, Hesston to Wichita, Kans.; Knupp Const. Co.; Newton, Kans., field office, Cliff Harris, spreadman.

Cities Service Gas Co.—66 miles, 6-7-8-10-in., under way, takeup Hutchinson to Wichita, Kans.; Knupp Const. Co.; Newton, Kans., field office, Cliff Harris, spreadman.

Lining up and welding off-shore pipeline.



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Cities Service Gas Co.—40 miles, 4-10 in., Kansas, field office, Liberal; Pat Gilmore, spreadman; Knupp Construction Co., Inc., contractor.

Cities Service Gas Co.—56 miles, 16-10-3-in., authorized, Sedgwick, Harvey, and Labette counties, Kansas.

City of Alabama.—84 miles, 3 to 8-in., under way, Alabama; Modern Welding Co., Inc., contractor, D. D. Foreman, spreadman. Completion date October 1951.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned, Coast and Valley region, California.

Colorado Interstate Gas Co.—215 miles, 20-in., planned, Texas Panhandle to Colorado.

Commonwealth Natural Gas Corp. — 69 miles, 12¾-in., under way, Petersburg, to Norfolk, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp. — 14 miles, 8-in., under way, Suffolk to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp. — 10 miles, contracted, laterals—Richmond, Suffolk, and Portsmouth, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—99 miles, 18-in., under way, Stanardsville to near Petersburg, Va.; Ray L. Smith & Son, contractor, Don C. Smith, Orange, Va., spreadman.

Commonwealth Natural Gas Corp. — 537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

East Tennessee Natural Gas Co.—172 miles, 22-in., proposed, Greenbrier to Oak Ridge, Tenn.

Egyptian Natural Gas Co.—80 miles, 6-8-in., authorized, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—122.9 miles, 30-in., proposed, looping along main line in Texas, New Mexico, Arizona.

El Paso Natural Gas Co.—470 miles, 24-in., under way, San Juan basin, New Mexico, to Franconia, Ariz.

Grand Valley Pipe Line Co.—105 miles, 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Michigan Transmission Corp. — 680 miles, 30-in., proposed, Perryville, La., across Arkansas, Missouri, and Illinois to terminus near St. John, Ind.

Hope Natural Gas Co.—32 miles, proposed, Fairmont to Terra Alta, W. Va.

Hugoton Production Co.—40 miles, 20 to 4-in., under way, near Ulysses, Kans., gathering system. Reese Bros. Const. Co., contractor, Hugoton, Kans., field office, Paul G. Reese, spreadman.

Humble Oil & Refining Co.—42 miles, 10-in., under way, Anahuac Gasoline Plant near Anahuac, Tex., to Gulf States Utilities plant near Beaumont, Tex.; Houston Contracting Co.; Winnie, Tex., field office; J. A. Cantrell, superintendent.

Kansas - Nebraska Natural Gas Co.—65 miles, 2-8-in., planned, Big Springs field to Ogallala, Neb., and to Ovid, Neb.

Kansas - Nebraska Natural Gas Co.—60 miles, 8-10-12-in., under way, Grand Island to Albion, Neb.; 40 miles, 6-in., under way, Albion to Norfolk, Neb.; 26 miles, 6-in., under way, Albion to Neligh, Neb. Jayhawk Const. Co., Inc., contractor, T. L. Hickerson, spreadman.

Kansas-Nebraska Natural Gas Co., Inc.—22 miles, 12-in., planned, Holcomb to Scott City, Kans.; 12 miles, 12-in., planned, Blakeeney to Palco, Kans.; 34 miles, 12-in., planned, Palco to Phillipsburg, Kans.; 10 miles, 12-in., planned, Alma to Holdredge, Neb. (replacement lines). Neb., 39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in., planned, Neligh to Hartington, Neb. (extension).

Manufacturers Light & Heat Co.—172 miles, 16-20-24-in., proposed, Clinton County, Pennsylvania, to vicinity of Pittsburgh, Pa.

Manufacturers Light & Heat Co.—50 miles, contracted, near Pittsburgh, Pa.; 75 miles, near Bradford, Pa.; Britton Contracting Co., contractor.

Michigan Consolidated Gas Co.—180 miles, 24-in., planned, Austin, Mich., to Detroit.

Mississippi River Fuel Corp.—98 miles, 16 and 18-in., proposed, feeder line from Lincoln Parish, La., to Waskom field, Harrison County, Texas.

Mississippi River Fuel Corp. — 40 miles, 18-in., authorized, Dubach to Perryville, La.

Missouri Central Natural Gas Co.—30 miles, 6⅝-in., contracted, Macon to Moberly, Mo.; L. R. Young Construction Co.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 6 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned, Summers or Monroe counties, W. Va., to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—39 miles, 20-in., authorized, Potter County, Pennsylvania, to Livingston and Monroe counties, New York.

New York State Natural Gas Corp.—26 miles, 20-in., authorized, New Kensington to South Bend, Pa.

New York State Natural Gas Corp.—51 miles, 20-in., authorized, New Kensington, Pa., to Ohio line.

New York State Natural Gas Corp. — 27 miles, 16-in. authorized, looping in Greene and Westmoreland counties.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

New York State Natural Gas Corp.—62 miles, 20-in., under way, Murrysville, Pa., to Petersburg, Ohio; 37 miles, 20-in., under way by May, Boome storage field to Ithaca, N. Y. Field office, Lawrenceville, Pa. Completion date October 1951; 23 miles, 20-in., contracted, state line station to Angelica, N. Y. Office, Wellsville, N. Y. Completion date October 1951: 82½ miles, 20-in., under way by May, Utica to Ithaca, N. Y. Field office, Clinton, N. Y., Leman Creech, supt.; 85 miles, 16-in., under way by September, Utica to Albany, N. Y.; Williams-Austin Co., contractor, Ed Peters, over-all general supt.

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way by April 1, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—511 miles 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—370 miles, 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northern Indiana Fuel & Light Co.—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in. authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

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Ohio Fuel Gas Co.—61 miles, proposed, northern and southwestern Ohio.

Oklahoma Natural Gas Co.—40 miles, 16-in., Velma to Chickasha, Okla.; Trojan Construction Co., contractor.

Oklahoma Natural Gas Co.—53 miles, 26-in., under way, Edmond to Depew, Okla.; Trojan Construction Co., contractor; "Swede" Tillotson, spreadman; Stroud, Okla., field office.

Oklahoma Natural Gas Co.—40 miles, 16-in., planned, Nimnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Pacific Gas & Electric Co.—47 miles, 8-in., authorized, Salina to Kilig City, Calif.

Pacific Gas and Electric Co.—141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Gas Pipe Line Corp.—2,175 miles, planned, Wharton County, Texas, via Oklahoma, Kansas, Fort Collins, Colo., to Portland, Ore., Tacoma and Seattle, Wash.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvania Gas Co.—52 miles, 12-in., between Warren and Erie, Pa.

Phillips Petroleum Co.—118 miles, 3-22-in. under way, Sherman and Hansford counties, Texas gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas Tex.

Piedmont Natural Gas Co.—28 miles, 6-in., proposed, North Carolina—laterals from Transcontinental gas system.

Potomac Gas Co.—18 miles, 16-in Dranesville to Arlington, Va.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

Public Service Co. of Northern Illinois.—25 miles, 10-in., under way, Matteson to Kankakee, Ill. Contracting & Material Co., Mantero, Ill., field office; Art Frye, spreadman. Completion date 6-10-51.

South Central Alabama Natural Gas Co. Inc.—150 miles, proposed, central Alabama.

South Georgia Natural Gas Co.—248 miles planned.

Southern Natural Gas Co.—120 miles, 16-in.; under way; Mitchell Village, Ala., to Bolingbroke, Ga.; Associated Pipe Line Contractors, Inc., contractor; Columbus, Ga. field office; Lacy Walker, spreadman.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta Ga.

Southern Natural Gas Co.—169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 20 miles in Ouachita Parish; 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P. G. & E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., system for Snyder gasoline plant, Vaughn & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville Miss., Midland and Portland, Tenn.

Tennessee Gas Transmission Co.—438 miles, planned, looping on Buffalo and New England extensions.

Tennessee Gas Transmission Co. and Northeastern Gas Transmission Co.—175 miles, 24-in., under way, Albany, N. Y., near Wilmington (Boston area), Mass. Oklahoma Contracting Co., contractor, Springfield, Mass., headquarters, Paul R. Halbert, manager, H. A. Wylie, spreadman at Pittsfield, Mass., Aldress Kilgore, spreadman at Westfield, Mass. L. B. Rea, spreadman.

Tennessee Gas Transmission Co.—304

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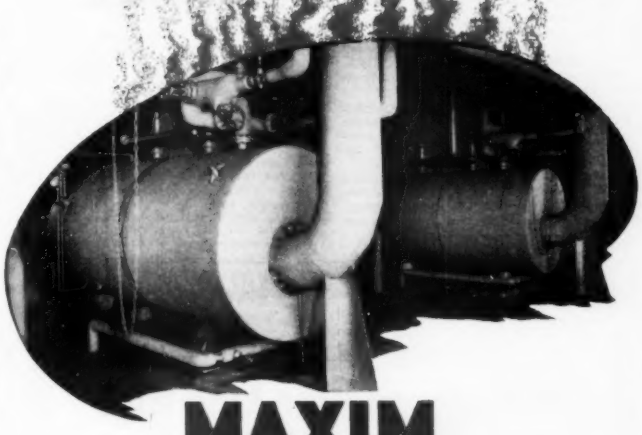

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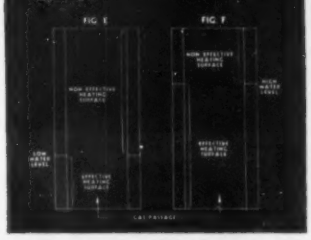

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miles, 24-in., proposed, between Mercer, Pa., and Utica, N. Y.; 528 miles, proposed, loops; 200 miles, proposed, miscellaneous lateral lines.

Tennessee Gas Transmission Co.—158 miles, 30-in., under way, vicinity of Jones, La., on the north to near Cypress, Tex., on the south; Houston Contracting Co. Four spreads located as follows: North end work at Bastrop, Tex., W. H. Hayes and M. L. Thompson, superintendents; center section at Natchitoches, La., E. C. Norris and R. E. Thornton, superintendents; south end at Conroe, Tex., F. A. Silar, superintendent.

Tennessee Gas Transmission Co.—64 miles 26 and 30-in., loops, contracted, South Texas. Oklahoma Contracting Co., contractor, field office, Falfurrias, Tex., Panama Shiflett, superintendent.

Tennessee Gas Transmission Co.—156 miles 24-in., under way, Hamburg to Onondaga-Madison County line, N. Y.; H. C. Price; Auburn and Warsaw, N. Y., field offices. G. A. Reutzel and R. K. Shivel, spreadmen.

Tennessee Gas Transmission Co.—120 miles, 24-in., under way, Hamburg to Hudson River; Bechtel Constructors, Inc.; Richfield Springs, N. Y., project office, R. L. Bowman and G. H. Homann, superintendents.

Texas Eastern Transmission Corp.—791 miles, 30-in., planned, Kosciusko, Miss., to Connellsville, Pa.

Texas Eastern Transmission Corp.—36 miles, 20-in., under way by 6-1-51, Connellsville, Penna., to Oakland Storage area; Mahoney Contracting Co.; Henry Mogg, superintendent.

Texas Eastern Transmission Corp.—163 miles, 30-in., under way, Kosciusko, Miss., to Florence, Ala.; Williams Bros.-Davis Co.; Kosciusko, Miss., field office, G. R. Hamilton, spreadman.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—189 miles, 26-in., proposed, Acadia Parish to connection with existing facilities in Morehouse Parish.

Texas Gas Transmission Corp.—195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—425 miles, 26-in., proposed, looping from Bastrop, La., to Hardinsburg, Ky.

Texas Gas Transmission Corp.—580 miles, 26-in., proposed, Louisiana and Kentucky.

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christi area to Joliet, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11. M. T. Wilhite, superintendent; field office, Du Quoin, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Effingham to Sibley, Ill., Midwestern Constructors, Inc., contractor of Schedule 12. Monticello, Ill., field office, Cliff Simmons, superintendent.

Texas-Illinois Natural Gas Pipeline Co.—92 miles, 30-in., under way, Sibley to Joliet, Ill.; Midwestern Constructors, Inc., contractor of Schedule 13. Morris, Ill., field office, Denver Franklin, superintendent.

Texas-Illinois Gas Pipe Line Corp.—480 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. A. M. Berlander, general superintendent; field offices at Newport, Ark., J. E. Richardson; Texarkana, Ark., V. L. Williams; Popular Bluff, Mo., A. M. Berlander.

Texas-Illinois Gas Pipe Line Corp.—300 miles, 30-in., contracted; Trinity River to Texarkana; H. C. Price, contractor. Work under way.

Transcontinental Gas Pipe Line Corp.—35 miles, 24-in., authorized, Paterson lateral to Greenwich, Conn.

Trunkline Gas Co.—1,775 miles, 10-26-in., under way, includes 740-mile, 26-in. Lake Charles, La., to Tuscola Station of Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in., Lake Charles, La., to McAllen, Tex., completion due October 1, 1952.

Trunkline Gas Co.—50 miles, 26-in., contracted, Longville to northeast vicinity of Hineston, La.; 126 miles, 26-in., contracted Epps to Hineston, La.; 42 miles, 16-20-in., under way, Lake Arthur, Longville to point north of Iowa, La., (Section 1, lateral line); 33 miles, 20-in., under way, Lake Arthur, La., to Lacassine, La.; Houston Contracting Co., contractor.

Trunkline Gas Co.—176 miles, 26-in., under way, Darnell, La., to Longville, La.; Houston Contracting Co., contractor of Section A, main line. E. C. Norris, Olla, La., spreadman. W. H. Hayes, spreadman, De Ridder, La.

Trunkline Gas Co.—180 miles, 26-in., contracted, Darnell, La., to Senatobia, Miss.; Anderson Bros. Corp., contractor, Section B, main line.

Trunkline Gas Co.—184 miles, 26-in., under way, Senatobia, Miss. to Paducah, Ky.; R. H. Fulton & Co., contractor of Section C, main line. Clark Williams, Memphis, Tenn., spreadman.

Trunkline Gas Co.—186 miles, 26-in., contracted, Joppa to Tuscola, Ill.; Mahoney Contracting Co., contractor of Section D, main line. Flora and Marion, Ill., field offices, Henry Mogg and Barney Finnerty, spreadmen.

Trunkline Gas Co.—262 miles, 20-in., contracted, McAllen to Altair, Tex.; R. H. Fulton & Co., contractor of Section E and F, lateral lines.

Trunkline Gas Co.—217 miles, 24-in., contracted, Longville, La., to Altair, Tex.; Anderson Bros. Corp., contractor of Sections G and H, lateral line.

United Gas Pipe Line Co.—30 miles, 16-in., authorized, Baldwin County, Alabama, southeasterly to Escambia County, Florida.

United Gas Pipe Line Co.—93 miles, 6 to 16-in., under way, fields in Plaquemines Parish, Louisiana, to near New Orleans. H. C. Price, J. Ray McDermott, and Brown & Root, contractors.

United Gas Pipe Line Co.—100 miles, 20-24-26-in., contracted, Near Houma to Franklin, La.; Associated Pipe Line Contractors, Inc.

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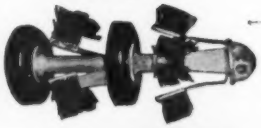
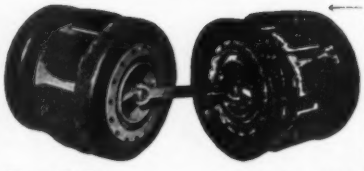
4" Size—TYPE JRN—2" to 4" sizes. Will pass 1½R-90° Bends. No valves other than full diameter thru-port valves. Use TYPE SCN-51 for 6" Size.



8" Size — TYPE WC-11 — 8" to 14". Will traverse 6 foot radius field bends, full diameter side openings at 45°. SPRINGS COMPENSATE for BRUSH WEAR.

20" Size—TYPE GP-2—16" to 30". 200-LB. SPRING Forces the Brushes against pipe wall —COMPENSATING for WEAR. Will traverse round-opening gate valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP PIGS.



24" Size — GP-3 — 18" to 30" Sizes will pass 1½R-90° Bends. SPRINGS COMPENSATE for BRUSH WEAR, ASSURING Full section cleaning efficiency. GP-3 consists of two Type GP-1 Pigs. — Each Unit may be used as individual pig.

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United Gas Pipe Line Corp.—510 miles, 24-26-30-in., contracted, Agua Dulce, Tex., to Monroe, La.; 233 miles, 20-24-26-30-in., from Pure Oil Co.'s offshore platform Block 32 Eugene Island area to Jackson, Miss., comp. sta.; 42 miles, 24-in., from Verna comp. sta., Miss., to Baxterville, Miss., dehydration plant; 52 miles, 20-24-26-in., Lirette to Napoleonville, La. to tie into Eugene Island-Jackson, Miss. 30-in. line mentioned above; 60 miles, 12-16-20-in., from Lafayette comp. sta. and Weeks Island field to Franklin, La., to connect with above mentioned 30-in.; 59 miles, 30-in., Jackson comp. sta., Miss., to Texas Eastern Trans. Corp. proposed 30-in. line near Kosciusko, Miss.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted by Gulf Southern Contractors, a joint venture including Texas Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott and Morrison-Knudson. Inspection by Brown & Root, Inc.

U. S. Army Engineers.—190 miles, 6⅝-in., under way, Searsport to Limestone, Me.; Associated Pipe Line Contractors, Inc. Completion date 10-15-51.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—1,408 miles, 30-in., planned, northern Alberta to Vancouver, B. C., and northern California.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned, Southern Alberta to Duluth, Minn.

York Gas Co. and Corning Glass Co.—30 miles, York, Pa., and Corning, N. Y.; Britton Contracting.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta Pacific Oil Pipe Line Co. (Brokaw, Dixon, McKee).—970 miles, 16-in. proposed, Edmonton south to Kingsgate, B. C., to Washington to Vancouver, B. C.

Basrah Petroleum Co.—72 miles, 12-16-in., under way, Zubair to Fao, Iraq.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroliferos Fiscales.—400 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

Middle East Pipelines, Ltd.—800 miles, 34-36-in., planned, Iran to a Levantine port.

Montreal Pipe Line Co., Ltd.—68 miles, 18-in., under way, near Highwater, Que., to Montreal East; Fred Mannix & Co., B. V. Elliott, superintendent, Cowansville, Que. (Section 3).

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Petroleos Mexicanos.—100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Shell Caribbean Petroleum Corp.—10 miles, 20-in., under way, Across Lake Maracaibo, Venezuela, S. A. Mahoney Contracting Co.; Angelo Tavernaro, superintendent.

Shell Caribbean Petroleum Co.—165 miles, 30-in., under way; Palmarejo to terminals on the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 12-51. Land sections contracted by Williams Brothers, de Venezuela, S. A., Charles P. Williams, manager, Marvin E. Jones, superintendent. Water crossings contracted by Mahoney Contracting Co.

Shell Caribbean Petroleum Co.—18 miles, 4-in., under way, Mara to Palamarejo.

Shell Caribbean Petroleum Co.—16 miles, 14-in., under way, Tia Juana to Cabimas (hot oil).

Trans-Mountain Oil Pipe Line Co.—715 miles, proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., contractor. Completion date 1952.

Winnipeg Pipe Line Co., Ltd.—75 miles, 10-in., under way, Gretna to Winnipeg, Manitoba; Sparling-Fowler Co., Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles, 6-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia. Carolina Construction Co.

Colombian Ministry of Petroleum.—75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 4-in., under way, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor.

Estrada de Ferro Santos Jundiai.—32 miles, 10-in., under way, Santos to Sao Paulo, Brazil; Techint, contractor.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—10-in., planned, Sarnia to London, Hamilton to Toronto.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S. A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Petroleos Mexicanos.—155 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

Societe des Transports Petroliers par Pipe Line.—150 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar, to Bogota, Colombia; Williams Brothers Corp., David Louthen, manager, Bogota.

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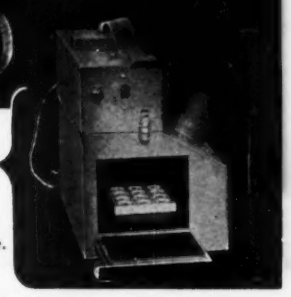

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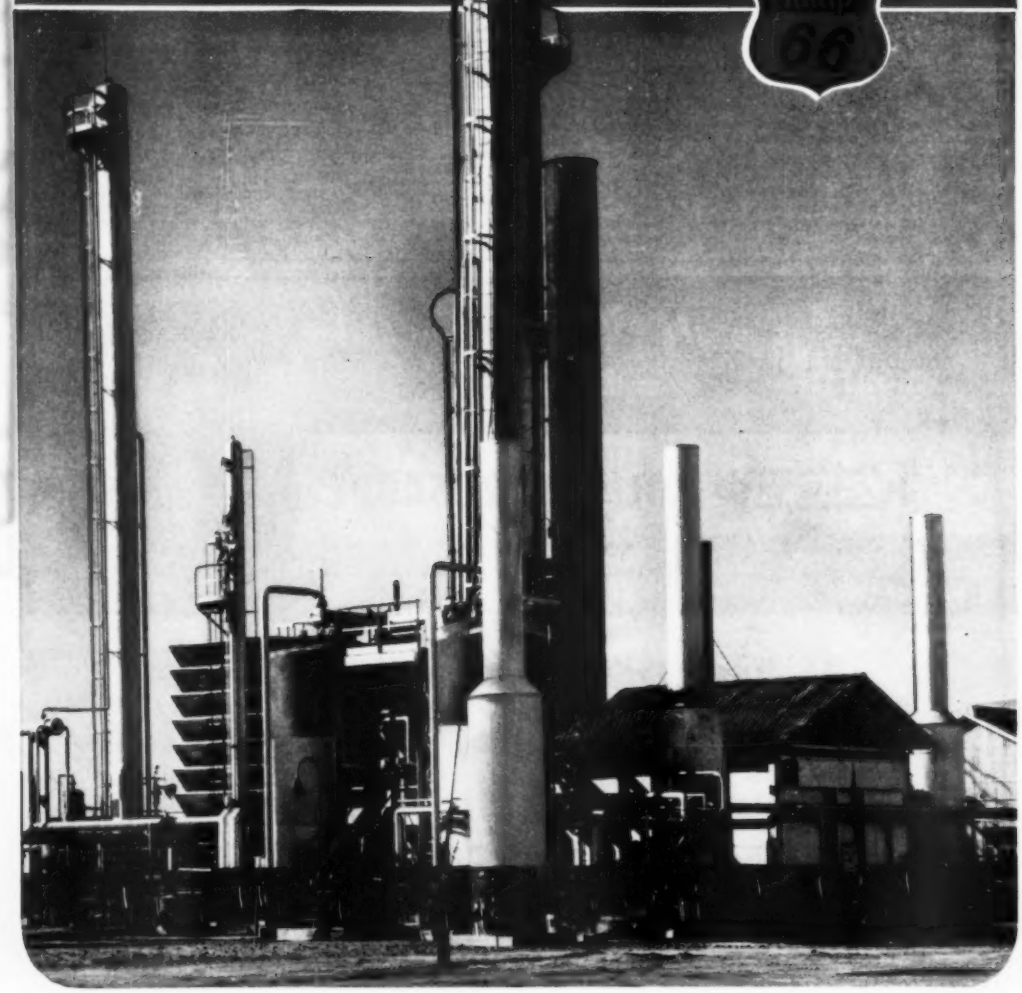

REFINING

Conoco Expands

Westlake construction to get under way June 1

HOUSTON.—The newly announced $24,000,000 construction program at Continental Oil Co.'s Westlake refinery will begin about June 1, and completion is scheduled for the latter part of 1952. *(The Oil and Gas Journal, May 17, page 77.)* The major construction contract has been let to Badger & Sons, Boston.

When completed, the new facilities will more than triple the rated daily capacity of the plant located near Lake Charles, La. It will have a crude-charge capacity of 40,000 bbl. per day.

According to Harold G. Osborn, vice president in charge of manufacturing, earlier enlargement plans calling for the doubling of capacity had to be scaled upward due to increasing military and civilian demands.

New units.—Modern processing units for producing high-quality products, including fighter-grade aviation gasoline, kerosene, burner distillate, and diesel fuel oils, will be included in the enlarged refinery.

The following processing units will be added: crude distillation, catalytic cracking, catalytic reforming, catalytic polymerization, gas recovery, and a solvent-extraction unit to separate benzene and toluene.

Alkylate facilities.—The existing alkylation unit is being revised and enlarged to produce approximately 3,600 bbl. daily of alkylate for fighter grade aviation gasoline with an octane range of 115-145. This represents a six-fold increase in capacity.

Auxiliary equipment will include new steam and electrical generation facilities and other units.

Residuum.—Selected crude oils will be segregated and processed at the refinery to produce a high-quality residuum, which will be pumped to Cit-Con Oil Corp.'s nearby lube plant for the manufacture of high-viscosity-index lubricating oils.

A highly aromatic feed stock will be produced and furnished to the carbon-black plant now being built adjacent to the refinery by Continental Oil Black Co.

Northwestern Refining Co. Plans 30,000-Bbl. Plant

ST. PAUL PARK, Minn.—Northwestern Refining Co. has begun construction of a complete new refinery here adjoining the site of its present plant.

The new project, scheduled for completion in 2 years, will include processing equipment for crude distillation, catalytic cracking, gasoline stabilizing, polymerization, and light-oils treating. It will have a processing capacity of 30,000 bbl. per day, according to Arthur T. Erickson, president of Northwestern.

Erickson said that the company has received a certificate of necessity from the Defense Production Administration for more than $2,000,000 to cover construction of the catalytic cracking and polymerization units.

Elmer R. Erickson, general manager, said Northwestern may get Canadian crude by way of the new Interprovincial Pipe Line Co. trunk line from Edmonton, Alta., to Superior, Wis. The company also is interested in current exploration and development going on in North Dakota. New fields in that state would provide a nearby source of crude.

Coast Oil Co. Takes Over Inactive Premier Refinery

COTTON VALLEY, La.—Coast Oil Co. has taken over the old Premier Oil & Refining Co. plant here and is putting it back in operation, according to Jack Coast, general manager.

The plant was shut down by Premier in May 1946, and has been inactive until Coast Oil moved in 6 weeks ago.

Capacity of the plant is 4,000 bbl. daily when fully rejuvenated. Coast Oil now has production up to 2,000 bbl. per day. The company plans to abandon its original plant at Cotton Valley when the former Premier plant resumes full operations.

Crude is being obtained from Cotton Valley and South Sarepta fields. Nearly all of the plant's output is presently being sold to Triangle Refineries, Inc., Houston.

Calco Expansion Completed; Air Force Gets Av-Gas

PERTH AMBOY, N. J.—First shipment of 15,000 bbl. of grade 100/130 aviation gasoline by California Refining Co. left the company's refinery here last week for delivery to the Air Force.

Aviation gasoline is being manufactured exclusively for the Armed Forces at the plant, where an expansion program doubling the refinery's capacity to 50,000 bbl. per day was completed recently.

A new 2,240-bbl. per day sulfuric acid alkylation plant, originally planned to raise octane ratings on

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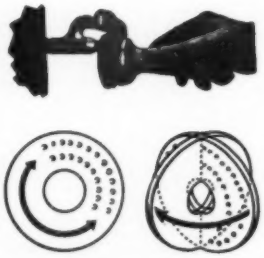

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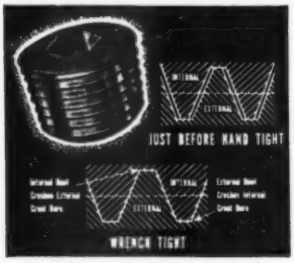

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motor fuel, was modified and a rerun tower added to the original design to facilitate the fractionation of aviation-grade alkylate. The $3,614,000 unit was one of 22 such projects approved for 100 per cent amortization. Isobutane and butylene or propylene are used as feed stocks.

Other units installed at the refinery during the expansion program were two 12,500 bbl. per day Houdriflow catalytic cracking units, a 10,000-bbl. thermal reforming unit, a distillation plant, and treating facilities.

Atlas Breaks Ground for Benzene-Production Units

SHREVEPORT.—Ground has been broken here by Atlas Processing Co. for the construction of a new $3,300,000 benzene plant which will manufacture about 420 bbl. during the first quarter of 1952, according to J. B. Atkins, president.

Benzene will be produced from gasoline produced in and piped from Carthage, Tex., field through an existing pipe line, Atkins said.

Major facilities to be installed include an extractive-distillation unit and a Platformer. Distillation facilities will be installed by Hudson Engineering Corp., Houston, while Procon, Inc., Chicago, will construct the Platforming equipment.

Atkins said the project was high on the list for receiving critically short materials, and that the Defense Production Administration has granted the company a certificate of necessity for accelerated cost depreciation of the new facilities.

This is the second project for benzene production in this area to be announced recently. Shell Oil Co. announced impending construction of new aromatics facilities at its Deer Park refinery a week earlier.

Benzene to be produced at Atlas' new plant already is under sales contract with a major chemical firm.

Esso Contracts for Tankers

NEW YORK.—Esso Shipping Co., Co. (N. J.) affiliate, has announced that it has completed negotiations for the construction of six super tankers with a volume capacity of 230,000 bbl. each.

The tankers, about 75 per cent larger than types built for the company during the war, will be built by Newport News Shipbuilding & Dry Dock Co. They are expected to be in service by January 1953. First of the vessels will slide down the ways in August 1952.

Each of the tankers will have a deadweight of 26,000 tons and a speed of about 16 knots. Addition of the new ships to the fleet of Jersey and its affiliates will increase the number of ocean-going craft to 130—18 added in the last 3 years.

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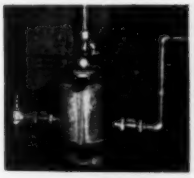

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Among the Drilling Contractors

Number of Active Rigs Increases to New High

The number of rotary rigs operating in the United States and western Canada increased to a new record level during the week ended May 21 (latest survey). Active rigs that week totaled 2,618, 71 more than during the previous week, the record week up to that time. The total for the United States alone was 2,491, an increase of 52 over the previous week's all-time high. Western Canada's total of 127 rigs was an all-time high and an increase of 19 during the week for that region. Previously, the greatest number of rigs ever reported running at any one time in that region was 123, which was during the week ended December 18, last year. Increases in activity were noted in all areas except Arkansas-North Louisiana-East Texas.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 5-21-51	Change week ended 5-14-21	Change week ended 5-22-50
Gulf Coast	557	+ 3	+ 59
W. Tex.-N. M.	878	+ 5	+154
Ark.-N. La.-E. Tex.	144	— 2	+ 13
Oklahoma	292	+ 1	+ 35
Kansas-S. Nebraska	169	+12	+ 15
Illinois-Eastern	157	+ 9	+ 22
Rocky Mountains	137	+12	+ 54
Pacific Coast	157	+12	+ 36
Total U. S.	2,491	+52	+388
Western Canada	127	+19	+ 66
Total	2,618	+71	+454

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States as a whole and the West Texas-New Mexico and Oklahoma-Kansas areas are shown by charts on pages 162 and 163.

L. B. Jackson, Jr., Tulsa, has taken a 7,000-ft. contract with The Texas Co. for an Arbuckle lime test to be drilled in the area about 3 miles west of Orr, in Jefferson County, southern Oklahoma. The test is 1 Wilton Howard. Location is in the NE NE NE 14-6s-4w, north of the shallow Oscar pool.

H. J. Uhl Drilling Co., Wichita, is drilling for Aladdin Petroleum Co. at 1 Reigle, a wildcat test in the NW NE SW 12-22-3e, about 2 miles west of the Peabody pool in southern Marion County, Kansas.

Frontier Drilling Co., Denver, has moved in a rotary rig for a 4,500-ft. exploratory test to be drilled for Seaboard Oil Co. of Delaware on the northwest flank of the Big Coulee-Hailstone structure in southwestern Wheatland County, Montana. Location is in the NE SE NW 22-6n-18e, near Ryegate.

Hubbell & Webb, Stroud, Okla., will drill for Mid-Continent Petroleum Corp. at a wildcat location 2 miles south and a little east of Carney, Lin-

On location in the Walnut Bend field, Cooke County, North Texas, where Arrow Drilling Co., Dallas, is drilling for Sinclair Oil & Gas Co. Floyd Cash (right end of front row) is toolpusher for the contracting company. With him in the picture are members of one of his crews. They are, left to right, front row: J. L. Preston, Leo May, and Paul Medlock (driller); back row, G. W. Hammer and Adlor Cagle.

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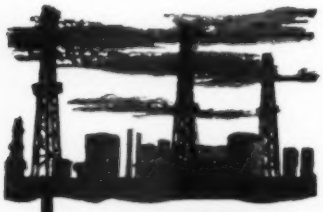

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Lincoln County, Oklahoma. Location is on the operator's Smith lease, in the SW SW NW 16-15n-3e. Contract is for 5,300 ft. Rig is on location.

Lewis Drilling Co., Wichita, is the contractor on a wildcat test which J. H. Tatlock is starting at 1 Bales, in the NE NE SE 6-19-12, 1½ miles north of the Rusco pool, in Barton County, Kansas.

Don Slape Drilling Co., Olney, Ill., is drilling for T. Blake Dirickson at a wildcat location about ¾ mile north of the Passport pool in northeastern Clay County, Illinois. Location is on the Klinger lease in the SE SE NW 1-4n-8e.

Denver Basin Drilling Co. is moving a rotary rig to the Akron area in Washington County, Colorado, where it has a contract for a Morrison sand test to be drilled for J. M. Huber Corp. The test will be 1 Cartwright and Strong. Location is in the NW NW SW 24-3n-53w.

Briscoe & Clingman Drilling Co., Oklahoma City, is starting a Wilcox sand test on the northeast flank of the West Edmond field, in Oklahoma County, Oklahoma, for Powel Briscoe, Inc. Location of the test, 1 Gilmore, in the C SE NW 34-15n-4w, is about 8 miles northwest of Edmond. Objective is expected around 7,150 ft.

J. W. Rudy, Clay City, Ill., is the contractor on a wildcat test which Walter S. Appling is starting in northern Clinton County, Illinois, at 1 Knaus, NW NE NW 27-3n-3w. The location is about 5 miles northwest of Carlyle, and about 2 miles north of production in the Carlyle pool.

Stickle Drilling Co., Wichita, is keeping two rotary rigs working for The Texas Co. in the Fall Creek pool, Sumner County, southern Kansas, near the Oklahoma line. Latest operation for the company is 3 Hudson, in the SW NW NW 10-35-3w. The pool's Simpson producing zone is at a depth of around 4,750 ft.

Dudley & Heath Drilling Co., Carmi, Ill., has a rig working on a wildcat location in the area 3 miles east of Ridgeway, in eastern Gallatin County, Illinois, where it is drilling for Oil Management, Inc. The operation is 1 Rider, NE SE SE 27-8s-9e.

Davenport Drilling Co. tools are being used on a 2,500-ft. wildcat test which William H. Atkinson has started at 1 Edwards, NW SE SW 10-3s-6w, south of the Palacine field, Stephens County, Oklahoma.

Armer Drilling Co., Inc., Wichita, has been awarded a contract by Speer Drilling Co., also of Wichita, for a wildcat test located on the latter's Glasscock lease in the NE NE NE 25-23-13, about 1½ miles northwest of the Bedford pool, Stafford County, Kansas. Tools of the latter company in turn will be used in drilling a well for M. B. Armer, owner of Armer Drilling Co., in the recently opened Purdyville pool, in Hodgeman County, western Kansas.

Coats Drilling Co., Longview, Tex., is drilling on a wildcat test for John B. Coffee in the area about 9 miles west of Quinlan, in Hunt County, East Central Texas. Location is in the Mason League Survey on the operator's Leinart lease.

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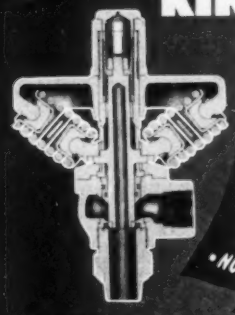

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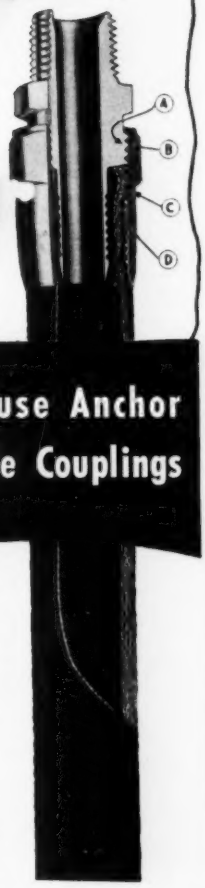

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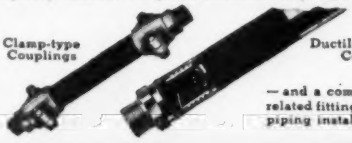

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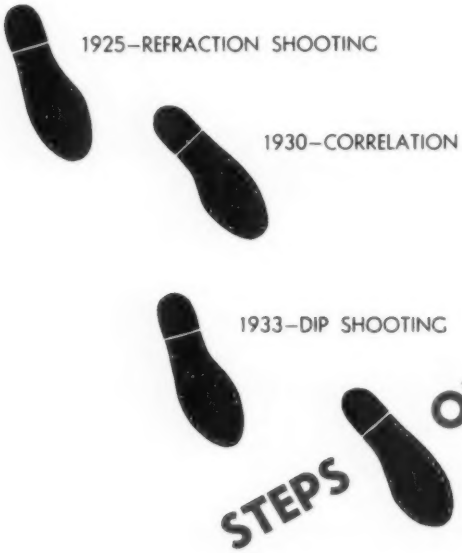


LEADING THE FIELD OF SEISMIC EXPLORATION

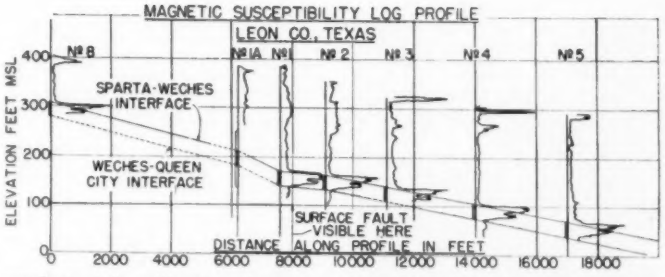
New Exploratory Tool

A NEW well-logging instrument which may have many uses in the search for oil is being readied for the industry. This instrument, developed and field tested during the past 3 years by Magnolia Petroleum Co. Field Research Laboratories at Dallas, provides long-needed control data for interpretation of surface and airborne magnetic surveys, permits detailed correlation of thick shale sections, in certain instances clearly delineates porous and permeable zones in a well bore, and offers possibilities for long-distance correlations and an additional basis for facies-change studies.

Magnolia's new device logs magnetic susceptibility (the ability of a material to respond to a magnetic field, a natural property of a rock not necessarily specific to rock type), which is primarily controlled by the iron content of the rock; and simultaneously measures the conductivity of the penetrated section. Since logs are made with an induction instrument they are independent of drilling fluid.

This instrument was developed for the purpose of verifying certain assumptions made in the interpretation of magnetometer survey data and to collect heretofore unavailable data of potential value. It has proven sound the assumed idea that residual magnetic variations observed on or above the surface could be attributed to basement relief, or to intrabasement variations in distribution of magnetic materials, by demonstrating that the magnetic susceptibility of sedimentary rocks is lower than basic igneous rocks to such an extent that the sedimentaries have little effect on magnetometer readings.

Sensitivity of the new magnetic logging device is such that sufficient contrast has been found in the sediments to yield logs of considerable lithologic character and results have demonstrated their use for correlation where strong magnetic marker beds are found (see cross-section). This specialized ability will have valuable application in some thick shale areas. Detecting layers of magnetic volcanic "dust" and heavy meteorite showers could give excellent time markers essentially independent of depositional environment over a considerable area. The magnetic log exhibits excellent reproducibility.



Comparisons of magnetic susceptibility logs with radioactivity logs, electrical logs, and core-analysis data have indicated concentrations of iron compounds at permeable beds. This finding led to tests using tracers (powdered iron) in drilling mud, and indications are that a significant concentration of iron can be built up in the mud cake for the log clearly to delineate porous and permeable zones.

As studies of sedimentologists show that iron compounds are deposited under certain "environments" it appears possible that an extremely useful tool has been added to the kit of the growing number of geologists who see the future finding of oil dependent on facies-change studies.

A technical paper on "Magnetic Well Logging" prepared by R. A. Broding, C. W. Zimmerman, E. S. Wilhelm, and A. A. Stripling, all of Magnolia's Field Research Laboratories, was presented orally at the annual meeting of the Society of Exploration Geophysicists in St. Louis last month. After additional data have been developed, a paper describing the instrumentation and illustrating the results of this new logging method will be published in S.E.G.'s "Geophysics."

See picture on page 56.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ALABAMA.—A third oil field for this state seems assured 2 miles northwest of Gilbertown field in Choctaw County. Crow Well Servicing Co. and Jack Reese 2 A. L. Pippen, 22-11n-5w, swabbed oil at the rate of 10 bbl. per hour through perforations at 3,794-3,812 ft.

TEXAS GULF COAST.—Ten miles northeast of Chapel Hill, Washington County has a new Wilcox strike at Sinclair Oil & Gas Co. 1 Bess Henry, Henry Gates Survey, Abstract 46. The wildcat flowed at the rate of 200 bbl. of 49°-gravity distillate per day through perforations at 9,420-28 ft.

WEST TEXAS.—Magnolia Petroleum Co. 4 Scales, east side test in Wellman Wolfcamp field of Terry County, was reported 188 ft. higher on the reef formation than any well in the field. Completion potential of the well was 2,030 bbl. daily, based on a 6-hour flow, through ½-in. choke.

TEXAS PANHANDLE.—A well in the Anadarko Basin of Ochiltree County was hailed as the county's first commercial producer as it swabbed and flowed 45 bbl. of oil in 6 hours. The test is The Texas Co. 1-B McGarraugh, 139-13-T&NO, which is 2½ miles northwest of gas production in Lips field of northern Roberts County.

North Central Texas

Stonewall, Fisher Counties Complete New Discoveries

WICHITA FALLS.—C. L. Norsworthy 1 T. A. Upshaw, Caddo discovery northeast of Aspermont in Stonewall County, was completed for 257 bbl. of oil a day through 12/64-in. choke, from perforations at 5,945-70 ft. The well had penetrated 7 ft. of conglomerate, at 6,110 ft., but apparently had no shows in that section.

Two miles southwest of Aspermont, DeSoto Oil Co. 1 Bullard was completed as a Canyon sand discovery. The new well rated a daily potential of 419 bbl. of 41°-gravity oil, flowing through ¾-in. choke on perforations at 4,888-5,920 ft. It was the firm's second discovery in the Aspermont area. Operators have requested the name of Aspermont Lake for the new pool.

New Ellenburger production has been established by G. E. Kadane & Sons at 1-A B. L. Cariker, in the R. H. Hibbett Survey, 1 mile southeast of Royston. The well was completed on the pump for 140 bbl. of oil a day from 5,810-35 ft.

Northwest of Hamlin, General Crude Oil Co. 1-A Ulmer had some oil and gas on a test of Canyon sand. A drill-stem test from 4,592-4,606 ft. recovered 20 ft. of oil-cut mud, and a second test from 4,592-26 ft. recovered drilling mud and salt water. Third test from 4,871-96 ft. recovered 80 ft. of heavily oil and gas-cut mud with no water. It continued drilling below 4,979 ft.

One mile west of West field in Wichita County, and separated from it by a dry hole, Hale & West 1 J. H. Allison was completed as a new Strawn sand discovery. Completion on the pump rated a daily potential of 115 bbl. of 43°-gravity oil a day from pay at 4,273-88 ft. Location of the new strike is 5 miles west of Wichita Falls.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: I. D. Campbell 1 A. D. Britton, H. Kirk Sur., TD 1,746 ft., pay 1,549 ft., pumped 75.7 bbl. 40°-gravity oil.

Clay County: Dub-Wood Drilling Co. 2 H. W. Perkins fee, Parker CSL, 4 mi. SW Petrolia, TD 1,679 ft., pay 1,669 ft., pumped 96 bbl. 42°-gravity oil.

Cooke County: Hollandsworth Oil Co. 1 Fleitman, G. Steele Sur., 4 mi. SW Myra, TD 1,578 ft., flowed 2,000,000 cu. ft. of gas.

Eastland County: Edgard H. Stapper 1 R. E. Adams, McLennan CSL, 4½ mi. SE Eastland, TD 1,547 ft., elev. 1,457 ft., Strawn 1,541 ft., perf. 1,540-46 ft., pumped 17 bbl. 41°-gravity oil.

Jack County: Jennings, Wheeler & Ingraham 1 C. E. Clayton, TE&L Sur., 3 mi. NE Jermyn, TD 4,970 ft., conglomerate 4,915 ft., pay 4,912 ft., flowed 100 bbl. 44°-gravity oil, 32/64-in. choke, CP 500 psi.

Wichita County: Panhandle Producing & Refining Co. 1-A Smith and Carrigan, B. N. Ferguson Subd., Day Land & Cattle Co. Sur., TD 3,932 ft., shot 3,903-20 ft., flowed 30 bbl. 40°-gravity oil, 10/64-in. choke.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Leland Fikes 1 J. Mowl, Sec. 55, William Ainsworth Sur., dry, TD 5,225 ft.

Brown County: Barron Kidd 1 Wallace Lewis, Sec. 24, HT&B Sur., dry, TD 1,124 ft.

Clay County: J. C. Jennings 1 M. L. Henderson, TE&L Sur., dry, TD 885 ft.

Coleman County: Cree & Branham 1 P. L. Legg, GH&H Sur. 27, dry, TD 2,984 ft.

C. L. McMahon, Inc. 1 P. J. Reeves, Thomas Moffett Sur. 246, dry, TD 2,480 ft., elev. 1,665 ft., Gardner 1,900 ft., Caddo 2,430 ft.

Comanche County: Terrell Petroleum Co. 1 G. F. Caraway, Wm. Swan Sur., dry, TD 2,880 ft.

Cooke County: Kingery Bros. 1 P. E. Redman, Z. Townsley Sur., dry, TD 1,773 ft.

Eastland County: Max Clairfield 1 C. L. Garret, 13-4-H&TC, dry, TD 3,640 ft., elev. 1,495 ft., Lake sand 3,220 ft., Marble Falls 3,330 ft.

H. B. & G. Drilling Co. 1 W. Sneed, 23-4-H&TC, dry, TD 4,033 ft., elev. 1,540 ft., Lake 3,308 ft., Ellenburger 3,966 ft.

Neeld & Hood Drilling Co. 1 N. L. Sudderth, J. Lehea Sur., E edge Ranger townsite, dry, TD 1,684 ft.

Haskell County: Arkansas Fuel Co. 1 Mary Louise Kleiner, J. M. Cass Sur. 59, dry, TD 2,890 ft., elev. 1,447 ft., reef 2,838 ft.

E. K. and E. M. Burt 1 A. J. Sanders, S. McFerron Sur., dry, TD 4,812 ft., elev. 1,515 ft., Strawn sand 4,675 ft., Burson sand 4,725 ft.

D. E. Hughes 1 S. W. Scott Ranch, Sec. 28, W. Thornton Sur., dry, TD 5,075 ft., elev. 1,441 ft., Palo Pinto 3,250 ft.

G. E. Kadane & Sons 1 Ira Hester, O. Smith Sur., dry, TD 5,101 ft.

Jack County: Bridwell Oil Co. 1 J. J. Myers, C. W. Hassell Sur., dry, TD 2,971 ft.

John T. Wilson et al 1 W. D. Moore, Sec. 2, SPRR Sur., dry, TD 652 ft.

Palo Pinto County: Zenith Petroleum Corp. 2 Mrs. Helen H. Johnson, Sec. 5, J. Poltevent Sur., dry, TD 1,700 ft.

Parker County: Kingwood Oil Co. 1 J. E. Culwell, J. R. Clifton Sur., dry, TD 3,198 ft., elev. 765 ft., Caddo 2,660 ft., Daly reef 2,840 ft., Bend conglomerate 3,032 ft.

Shackelford County: Big West Drilling Co. 1 J. H. Nail 8, Sec. 48, ETRR Sur., dry, TD 1,526 ft.

H. J. O'Donnell et al 1 W. H. Green, Sec. 23, BAL Sur., dry, TD 4,361 ft., elev. 1,306 ft., Caddo 3,644 ft., Ellenburger 4,332 ft.

G. E. Kadane & Sons 1 Elliott, Blk. 14, BOH Sur., dry, TD 2,446 ft.

Stephens County: Harrison & Hailey 1 J. H. Collins, 33-5-T&P, dry, TD 3,260 ft.

Throckmorton County: Woodson Oil Co. 1 J. L. Carpenter, Sec. 1,631, TE&L Sur., dry, TD 1,676 ft.

Wilbarger County: Neeld & Hood Drilling Co. 1-A Ancell, 35-6-H&TC, dry, TD 2,717 ft.

Frank Wood 1 W. T. Waggoner KK, 37-4-H&TC, dry, TD 2,000 ft.

Young County: Gray Oil Co. 1 W. E. Harty, W. Ribble Sur., dry, TD 2,232 ft.

J. J. Lynn 1 H. M. Goldston, SPRR Sur. 9, dry, TD 2,900 ft.

Perkins Bros. 1 T. L. Griffin, Deiter Subd., TE&L Sur. 159, dry, TD 4,010 ft.

Eastern Texas

Humble Wildcat Coring Ahead After Testing

DALLAS.—Humble Oil & Refining Co. 1 Mattie McAdams, Freestone County wildcat east of Dew, was coring below 9,595 ft. in sand and shale, with no further shows reported below the last drill-stem test which recovered oil-cut mud at 8,947-81 ft.

Humble 1 McSwane, wildcat 1 mile northeast of Freestone, developed 1,800 ft. of water cushion and 45 ft. of slightly gas-cut mud on a 1-hour test from 8,348-77 ft. Shut-in pressure was 3,375 psi. At last report it had total depth at 8,620 ft. and was ready to run casing.

Imperial Producing Co. 1 Lindsey, Harrison County test northwest of Jonesville, prepared to test after perforating casing in the Pettit between 5,995-99 ft. That section had some gas shows when cored.

Southeast of Hallsville, Harrison County, Skeeters & Curry 1 W. T. Cock had casing set to 6,805 ft., 3 ft. off bottom, and prepared to perforate. A drill-stem test from 6,672-93 ft., open 15 minutes, had recovered 100 ft. of heavily gas and distillate-cut mud. Top of the Pettit was 6,498 ft., on elevation of 247 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Anderson County: Johnson Cone et al 1 Lalla Ritner, N. Hanson Sur., dry, TD 5,400 ft.

Falls County: W. P. Luse 1 Fred Voltin, L. Helzley Sur., 6 mi. SW Rosebud, dry, TD 2,943 ft., Edwards 1,460 ft.

Freestone County: The Texas Co. 1 A. C. Love, M. Rionda Grant Sur., 5 mi. E Fairfield, dry, TD 9,245 ft., elev. 403 ft., Woodbine 4,556 ft., Paluxy 6,425 ft., Massive anhydrite 7,905-8,015 ft., James 8,520 ft.

Lamar County: Hinton & Hager 1 Clarence Gardner, L. Roberts Sur., dry, TD 5,402 ft., Paluxy 2,671 ft., Massive anhydrite 3,563-3,654 ft., Cotton Valley 4,635 ft.

Wood County: J. M. Deupree 1 Liberty School, J. B. Tucker Sur., dry, TD 5,960 ft., Austin chalk 4,658-4,863 ft.

Stanolind Oil & Gas Co. 1 Four States Oil Co., H. Payne Sur., dry, TD 6,155 ft., elev. 465 ft., Woodbine 5,598 ft., Comanche 6,104 ft.

Michigan

Good Traverse Producer Indicated in Oceana County

MOUNT PLEASANT.—Carter Oil Co. appeared to have assurance of a good Traverse oil producer on its first test in the new Mears Traverse pool, Golden Township, Oceana County, at 1 Osborn, SW NW SE 35-15n-18w. Recovery was 986 ft. of free oil and 90 ft. of salt water on a 2-hour drill-stem test in the top of the Traverse at 1,750-56 ft. Well was drilled ahead and tested in the Dundee which showed to be dry on drill-stem test at 2,224-31 ft. A test of the Reed City-Monroe zone was scheduled before running casing, perforating, and completing.

The second of two followup tests in the Edwards Dundee oil pool, Ogemaw County, was dry in that objective at Socony-Vacuum Oil Co. 1 Kartes, SW NW SE 15-21n-Edwards Township. Hole may be plugged back for a test of a Traverse oil show, which has been flowing some oil while well was drilling on to the Dundee.

A second acid treatment, after plug-back following first acid shot, at Mogul Oil Co. 1 Hammar, SW SW NE 20-20n-9w, Sherman Township wildcat, Osceola County, brought in salt water again. Well may be carried deeper to test the Reed City-Monroe zones.

MICHIGAN WILDCAT FAILURES

Allegan County, Salem Township: Lloyd C. Green 1 Bouwkam-Brower, NE SE NE 9-4n-13w, Traverse 1,633 ft., dry, TD 1,649 ft.

Kalkaska County, Garfield Township: Taggart Bros. Gas Co. 4 Consumers Power Co.-Spring, C SE 35-25n-8w, Traverse 2,410 ft., dry, TD 2,416 ft.

Springfield Township: Taggart Bros. Gas Co. 3 Consumers Power Co., C NE 25n-8w, Traverse 2,394 ft., dry, TD 2,402 ft.

Manistee County, Arcadia Township: Neil Wagenaar & Edward Wagner 1 Bradford, NE SE NW 27-24n-16w, Reed City 1,658 ft., dry, TD 1,696 ft.

Mecosta County, Big Rapids Township: C. W. Collin et al 1 Larsen, NW NE SE 1-15n-10w, Dundee 3,470 ft., dry, TD 3,615 ft.

Green Township: Mogul Oil Co. 1 Bittner, NE NE NE 8-16n-10w, Monroe 3,528 ft., dry, TD 3,605 ft.

Midland County, Lee Township: Ward J. Blunt 1 Kimmey, NE SW SW 20-14n-1w, Dundee 3,559 ft., dry, TD 3,658 ft.

Montcalm County, Bloomer Township: Columbia Oil & Gas Co. 1 Harden, SW SW SE 20-9n-5w, Dundee 3,070 ft., dry, TD 3,132 ft.

Newaygo County, Monroe Township: Union Development Co. 1 Schooley, NW NW NE 11-15n-12w, Traverse 2,730 ft., dry, TD 2,770 ft.

Oceana County, Otto Township: Turner

Petroleum Corp. 1 Skala, SE NW SW 18-13n-16w, Traverse 1,928 ft., dry, TD 1,951 ft.

Ogemaw County, Horton Township: J. O. Mutch 2 Yeo, SE NE NE 2-21n-2e, dry in Richfield, TD 4,000 ft.

Texas Gulf Coast

Tests Indicate New Wilcox Strike in Washington County

HOUSTON.—A new Wilcox strike seems assured in Washington County 10 miles northeast of Chapel Hill at Sinclair Oil & Gas Co. 1 Bess Henry. On test of lower perforations at 9,420-28 ft., the well flowed at the rate of 200 bbl. of condensate per day through 3/16-in. choke. Gravity was 49°. The wildcat had previously indicated production on basis of drill-stem tests at 9,233-41 ft., 9,413-29 ft., and 9,438-58 ft. A total of 40 ft. of effective pay section is reported to have been encountered in the well. Total depth of the discovery is 11,513 ft. with 5½-in. casing cemented at 9,540 ft. Location is in William Gates Survey, Abstract 46.

Fidelity Oil & Royalty Co. has completed a new dual-sand gas discovery in Victoria County approximately 1½ miles northwest of Coletto Creek field. The well was formerly Progress Petroleum Co. 1 Horadam, abandoned in 1949 at 4,620 ft. Fidelity went into the hole, set 138 joints of 5½-in. casing to 4,416 ft., perforated and made a dual-sand completion. No gage was run on the well. It is located in Manuel Zepeda Survey, A-128.

George W. Graham, et al, 1 O. L. Caruthers, new gas-condensate pool discovery in the extreme southern part of DeWitt County, has been gaged, on 11-hour test for 994,590 cu. ft. of gas plus 25 bbl. of condensate through 10/64-in. choke. Tubing pressure was 2,450 psi. Production is through perforations at 7,452-58 ft. in the top 6 ft. of the Mackhank sand. The discovery lies in H. M. Sally Survey, A-417.

Three miles northwest of Criesman in Burleson County, B. W. Foss is preparing to take potential test at 1 Margaret Black, et vir, H. H. Goff Survey, Abstract 123. Operator is swabbing gas, oil, and wash water from open hole at 3,448-93 ft. Production is from the Navarro sand, which also produces in Criesman field, located 4½ miles to the southwest.

New Frio pay has been established on the south flank of Markham field in Matagorda County at Claud B. Hamil 9 C. M. Hudson, William Haden Survey. This flank test flowed 120 bbl. of 26.7°-gravity oil daily through perforations at 4,614-18 ft. through ¼-in. choke. Frio production had been previously discovered on the north flank of Makham dome

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Refugio County: Gas discovery—P. R. Rutherford 1 William Avery, Edward Perry League, A-40, TD 6,559 ft., perf. 2,272-87 ft., IP: 75,000,000 cu. ft. of dry gas daily, open flow.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Calhoun County: American Liberty Oil Co. 1 Little, W. M. Little Sur. 26, on Matagorda Island, dry, TD 7,030 ft.

Chambers County: Gulf Oil Corp. 1-C White, et al, S. Hankamer Sur., dry, TD 8,700 ft.

Grimes County: E. G. Goforth, et al, 2 E. G. Goforth, William Berryman Sur., 1 mi. SW of Todd, dry, TD 10,717 ft.

Jackson County: Claud B. Hamill 1 Maggie L. Young, et al, W. J. E. Heard Sur., A-31, dry, TD 6,505 ft.

Jefferson County: Crown Central Petroleum Corp. 1 Ector Smith, J. J. Broussard Sur. 16, A-665, dry, TD 8,830 ft.

Karnes County: H. L. Hunt 1 E. B. Hardt, et ux, Karnes County School Land Sur., A-168, dry, TD 8,015 ft.

Liberty County: Tarrant-Cockburn, et al,

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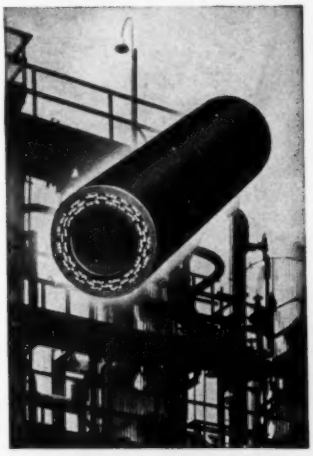

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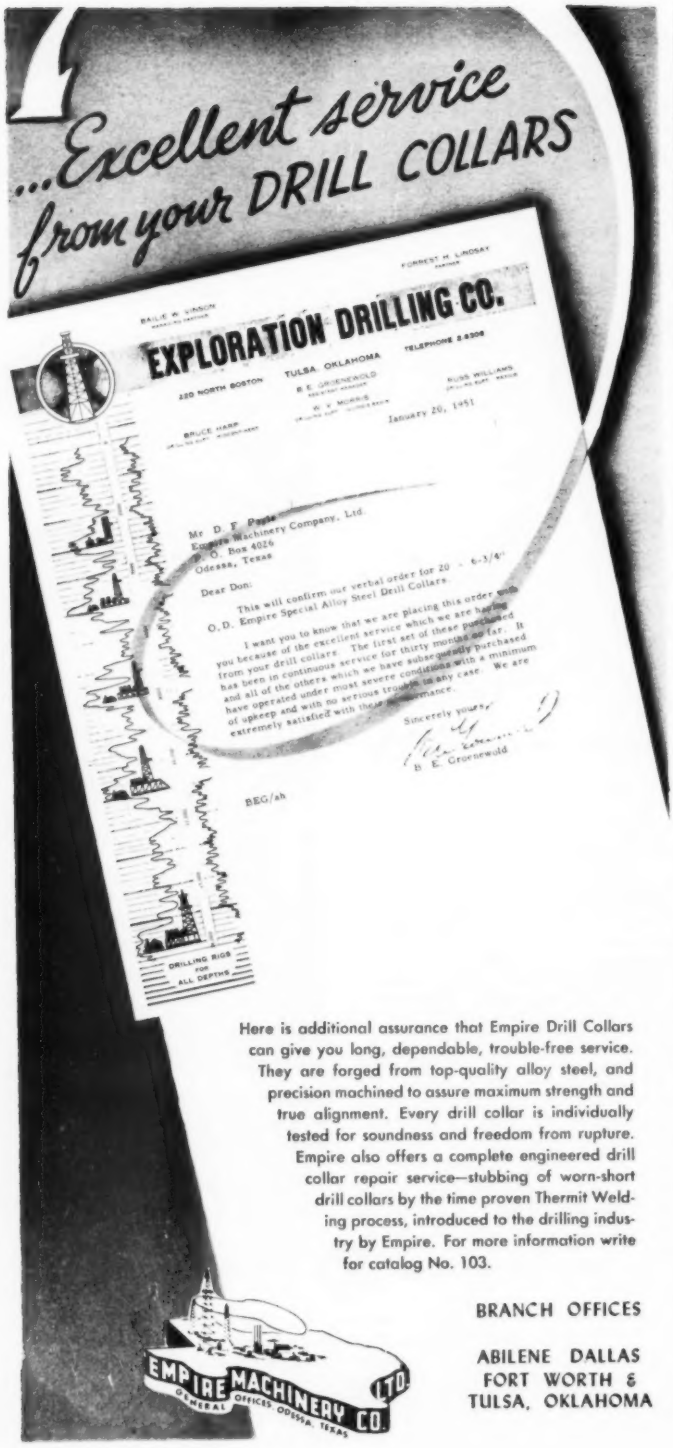
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1 Joe Rolke, Elizabeth Munson Sur., A-88, dry, TD 10,304 ft.

Refugio County: Jake L. Hamon, Edwin L. Cox & L. A. Douglas 1 Henry Schirmer, N½ of Sec. 17, Johnson & Pugh Subd. of T. D. Wood Lands, dry, TD 6,250 ft.

LaGloria Corp. & Skelly Oil Co. 1 Ellen Scott Toups, Dona Anastacio Reojas Sur., A-58, dry, TD 7,500 ft.

Seaboard Oil Co. of Delaware A-7 Jamie Hynes, Refugio Town Tract Grant, dry, TD 8,159 ft.

San Jacinto County: Commercial Petroleum & Transport Co. E-1 Coline Oil Co., James Rankin, Jr. Sur., A-40, dry, TD 4,480 ft.

Wharton County: W. A. Clark, Jr., 1 Richard Malek, I&GN Sec. 14, A-235, dry, TD 4,555 ft.

Rocky Mountain

Logan County, Colorado, Wildcat Gets Gas Shows

DENVER. — Another discovery for the northeastern Colorado area appears likely with the recovery of gas from the J sand at The Texas Co.'s wildcat in the Padroni area, Logan County. The well is 1 Gould, SW SW SW 20-9n-52w, east of any previous production in the current Denver-Julesburg basin play. Top of the J sand was logged at 4,616 ft., and on drill-stem test at 4,621-51 ft., the well flowed gas in 1½ minutes with the flow estimated at 4,000,000 cu. ft. daily over the 45-minute test. Recovery was 160 ft. of condensate and drilling fluid with no water. Texas is coring ahead on the wildcat.

Completion of a second failure in the exploratory drilling program through the basin and range province of Utah has not slowed operations of Continental Oil Co. and Standard Oil Co. of California through the area. The companies have completed unitization of the Summit Springs Unit, through Townships 19n and 20, Ranges 59e and 60e, covering 9,250 acres through White Pine County, Nevada, and plan a well immediately on the block.

This area, is some 20 miles north of their recent failure at 1 Unit, C NE NE 17-15n-59e, in the Hayden Creek area, which went to 5,117 ft., total depth, in Devonian. Shows were logged in both wells drilled by Continental and Standard of California in this region. Additional wildcat drilling in the Utah portion of the basin is planned for the current year.

Continental Oil Co. found a total of 209 ft. of Tensleep section, with approximately 137 ft. of saturation, at the first deep test in the Sussex area, Johnson County, Wyoming. The operator is now cementing casing for completion of the well as a producer from the fifth pay zone in the field. The well is 59 Unit, SW NW SE 17-42n-78w, and Tensleep was topped at 9,090 ft. with total depth at 9,299 ft. On drill-stem tests the well flowed from the top of the sand, and on the last test there was still oil with no water.

COLORADO WILDCAT SUCCESSES

Little Beaver Creek, Adams County: Orin Tucker et al 1 Hough et al, NW NE NE 1-2s-57w; TD 5,560 ft.; flowed 10,500 M.c.f. gas per day; Niobrara 4,375 ft., first sand ("D" sand) 5,188 ft., Muddy 5,262 ft., Dakota 5,522 ft.

Graylin, Logan County: British-American Oil Producing Co. 1 Monroe, NE NE SW 7-8n-53w; TD 5,525 ft., PB 5,028 ft.; pumped 95 bbl. oil and 1 bbl. water in 24 hours; Niobrara 4,064 ft., Ft. Hays 4,380 ft., Greenhorn 4,631 ft., "D" Sand 4,996 ft., "J" Sand 4,988 ft.

COLORADO WILDCAT FAILURES

Northwest Wellington, Larimer County: Suhr, Fielder & Locke 1 Mariotti, C SE SW 22-10n-68w; TD 4,171 ft.; abandoned.

Willow Creek, Moffat County: Stuart Mc-

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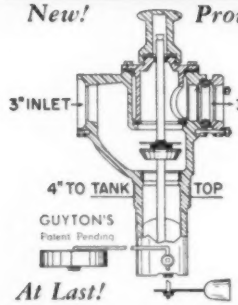

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Laughlin 1-A State, SE NE NE 36-4n-103w; TD 861 ft.; abandoned. Weber 692 ft.

WYOMING WILDCAT FAILURES

North Big Muddy, Converse County: Ralph Lowe 1 Eugene Combs, SE NW SE 28-34n-76w; TD 8,998 ft., abandoned. Shannon 4,928 ft., first Wall Creek 7,073 ft., second Wall Creek 7,534 ft., Muddy 8,200 ft., Dakota 8,333 ft., Lakota 8,411 ft., Morrison 8,490 ft.

Southeast Meadow Creek, Johnson County: P. T. Sharples 1-19-Government, TD 2,100 ft., abandoned.

NEVADA WILDCAT FAILURE

Hayden Creek, White Pine County: Standard Oil Co. of California and Continental Oil Co. 1 Unit, C NE NE 17-15n-59e; TD 5,117 ft., abandoned. Illapaha 1,586 ft., Chainmen 2,558 ft., Poana 4,058 ft., Pilot 4,119 ft., Nevada limestone 4,428 ft.

WESTERN NEBRASKA WILDCAT FAILURE

Alliance area, Sheridan County: Los Nietos Oil Co. 1 Bauer, NW NW NW 4-25n-46w; TD 3,245 ft., abandoned. Niobrara 1,720 ft., Ft. Hays 1,939 ft., Codell 2,063 ft., Carlile 2,105 ft., Greenhorn 2,247 ft., "D" Sand 2,532 ft., "G" Sand 2,650 ft., "J" Sand 2,750 ft., Skull Creek 2,808 ft., "O" Sand 2,987 ft., "R" Sand 3,053 ft., "T" Sand 3,203 ft.

Mississippi

New Wilcox Discovery Completed in Adams County

JACKSON. — Final completion has been made on another Wilcox strike in Adams County on the north edge of the city of Natchez. Kemp Drilling Co. 1 Ruth M. Gilbert, et al, 12-7n-3w, was completed for 53 bbl. of 29°-gravity oil daily through 6/64-in. choke. Completion was made through perforations at 4,403-05 ft. This test is located 1¼ miles west and slightly south of the Dorris Ballew 1 Natchez Country Club, which has shows of oil in the "4,600-ft." zone, but could not be completed as a producer. The field has been designated "Gardens."

In Perry County, 4 miles south of Richton, Union Producing Co. has conducted three successful drill-stem tests in its wildcat, A-1 B. M. Stevens, 19-4n-9w, and continues to core shows of heavy black oil in the Upper Tuscaloosa. A 30-minute test at 7,104-26 ft. recovered 25 ft. of mud cut with heavy black oil, and another at 7,167-79 ft. recovered 80 ft. of approximately 12°-gravity oil and 40 ft. of oil-cut mud. A previous test at 7,083-95 ft. recovered 110 ft. of 14° to 15°-gravity oil. At last report, operators had cored to 7,237 ft. and were preparing to core ahead with diamonds.

Alabama seems assured of a third oil pool at Crow Well Servicing Co. and Jack Reese 2 A. L. Pippen, 22-1nn-5w, Choctaw County. Operators are installing pumping equipment to test the well after swabbing oil at the rate of 10 bbl. per hour through perforations at 3,794-3,812 ft. The wildcat is producing from the "A" sand in the Eutaw formation. Core cut at 3,797-3,808 ft. recovered 10 ft. of broken oil sands. The prospective discovery is located approximately 2 miles northwest of Gilbertown field, also in Choctaw County.

MISSISSIPPI SUCCESSFUL WILDCAT

Adams County: Oil discovery, "Gardens"—Kemp Drilling Co., Inc., 1 Ruth M. Gilbert, et al, 12-7n-3w, TD 6,513 ft., perf. Wilcox 4,403-05 ft., IP: 53 bbl. oil per day, 6/64-in. choke, TP 500 psi., 29° gravity.

MISSISSIPPI WILDCAT FAILURES

Adams County: Kemp Drilling Co. 1 Miss Irene Daigle, 62-7n-2w, dry, TD 6,509 ft. Humble Oil & Refining Co. B-1 Hugh Y. Junkin, et al, 7-8n-3w, dry, TD 6,500 ft.

Southwest Texas

Heep Oil Pay Confirmed in San Patricio County Test

CORPUS CHRISTI. — Heep oil pay has been established at Rooke field just south of the western extension gas discovery on the San Patricio-Refugio County line. The new discovery is Plymouth Oil Co. F-5 E. H. Welder, on the San Patricio County side, in Section 30 of the E. H. Welder Ranch Subdivision. Through perforations in the Heep sand at 5,808-11 ft., the well flowed 108 bbl. of oil daily. Gravity of the oil was 42.3°. Hole was drilled to a total depth of 9,437 ft. before operators set 5½-in. casing to 5,920 ft. for completion.

Sunray Oil Co. has recovered oil-bearing sands while coring in its Dagger Island wildcat in Nueces County. Sands were cored at 7,285-90 ft., 7,290-91 ft. and 7,295-7,300 ft. in Sunray's 1 State Tract 351, 5 miles southwest of Port Aransas. The sands showed good oil and distillate odor and taste with fair porosity, fluorescence, and oil stain. This test will be drilled to 7,525 ft. where operator will core for Sand 8. It is located in Red Fish Bay approximately 2,200 ft. southwest of Shell Oil Co. 1 State Tract 341, gas-condensate discovery well.

Superior Oil Co. is testing a new deep zone at the 9,100-ft. level in 29 Minnie S. Welder located in Portilla field, San Patricio County. This is below previous production in the field. Hole is bottomed at 9,150 ft. with 7-in. casing set on bottom. Operator will probably perforate at 9,030-70 ft. and 9,090-9,108 ft.

Dry gas was recovered on drill-stem test run at W. Earl Rowe, et al, 1 R. V. Embleton, wildcat 4 miles southwest of Brownlee field, also in Jim Wells County. Test was conducted at 3,403-08 ft. Operator has set 5½-in. casing on bottom at 3,520 ft. for production tests. This test is located in Los Presenos de Arriba Grant, 5 miles north of Alice.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Aransas County: Oil discovery—Phillips Petroleum Co. 9 Copano Bay State Tract 67, located in Copano Bay, TD 8,050 ft., perf. Marginulina Frio 6,660-70 ft., IP: 361 bbl. oil per day, 3/16-in. choke, TP 1,150 psi., 42.5° gravity.

Oil discovery, "West Fulton Beach"—Sun Oil Co. 1 Copano Bay State Tract 76, located in Copano Bay, 2 mi. S-SW of Phillips 9 Copano Bay State well, TD 7,443 ft., perf. 7,126½-30½ ft., IP: 171 bbl. oil per day, ½-in. choke, 41° gravity.

San Patricio County: New pay at Rooke—Plymouth Oil Co. F-5 E. H. Welder, Sec. 30, E. H. Welder Ranch Subd., TD 9,437 ft., perf. Heep sand 5,808-11 ft., IP: 108 bbl. oil per day, X-30 choke, 42.3° gravity

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bastrop County: W. K. Powell 1 A. W. Young, Michael Green Sur., dry, TD 1,410 ft.

Caldwell County: Orion Oil Co. 1 W. E. Langley, M. Gillan Sur., 2 mi. NE of Fentress, dry, TD 2,094 ft.

Frio County: Humble Oil & Refining Co. 1 F. B. Simmons, Jr., BS&F Sur. 19, A-143, dry, TD 6,426 ft.

Gonzales County: Continental Oil Co. 1

LEGAL

7,120 ACRES of Tribal and 80 ACRES of Allotted Indian lands located in Townships 2, 3 and 4 South, Ranges 8, 9 and 10 West, within the jurisdiction of the Uintah and Ouray Reservation, Utah, are being advertised for lease, bids on which will be opened June 7 at 2:00 P.M. at the office of Forrest R. Stone, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from Mr. J. R. Schwabrow, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

Joe Thomas, Nathaniel Osborn Sur., A-368, dry, TD 5,471 ft.

Jim Hogg County: The Chicago Corp. 1 Rafeal Gomez, BS&F Sur. 123, 25½ mi. E of Zapata, dry, TD 2,907 ft.

LaSalle County: Kirkwood & Morgan, Inc., 1 O. S. Petty, Atascosa County School Land Sur. 298, A-704, dry, TD 5,310 ft.

Starr County: Jay Simmons 1 Vela Lease, Porc. 91, Share 2-A, dry, TD 3,309 ft.

Wilson County: B. Coleman Renick 1 A. H. West, et al, Lot 2, J. S. Mall Sur. 360, A-152, 2 mi. NE of Stockdale, dry, TD 3,032 ft.

Zapata County: Green Valley Drilling & Supply Co. 2 Rosa G. de Rodriguez, Share E of Charco Redondo Grant, dry, TD 1,300 ft.

Kansas

Finney County Wildcat Produces on Pump Test

WILLIAM L. HARTMAN appears to be making a good well in lower Pennsylvanian sand zone he has been testing in his 1 Damme, SE SE NW 21-22-33, northwestern Finney County wildcat. The operator has opened additional sand by reperforating and extending the original perforations at 4,630-32 ft. to take in an interval at 4,626-36 ft. On a late 6-hour test, the well pumped and flowed at an average rate of slightly over 71 bbl. of clean oil per hour.

Location of this discovery is about 3 miles east of the north end of the Hugoton gas area, and about 7 miles southeast of the Nunn pool, nearest oil production.

Testing also is under way at an important outpost and new oil-discovery in the East Adams Ranch area in Meade County, southwestern Kansas. It is Columbian Fuel Corp., United Producing Corp., and Helmerich & Payne, Inc. 1 Adams, NW SE NW 25-34-30. Prospective pay zone is the Marmaton lime, opposite which casing is perforated at 5,346-50 ft. Before running tubing and acidizing, the well swabbed at the rate of 5 bbl. of clean oil per hour. Total depth is 6,326 ft. in the Mississippian with casing at 5,950 ft.

Location of this well is about a mile southwest of the original discovery well, Helmerich & Payne, Inc. 1-A Adams, SW SW NE 24-34-30, completed in April 1948, producing gas and some oil from a zone identified as the Morrow sand at the Pennsylvanian-Mississippian contact. Operators are planning to go back in this well and test the Marmaton. The only other well in the area is Helmerich & Payne, Inc. 2 Adams, located in the C SE SE 36-34-30w, about 1½ miles to the southeast of the new Marmaton lime discovery. It was completed as a gas well in the upper Mississippian.

Outcome of the wildcat test drilled by Ben F. Brack in Cheyenne County, in the extreme northwest corner of the state, will be known soon. The test, 1 Judy, SE SE SW 26-1-39, drilled to a total depth of 5,141 ft. in granite, has casing run to 4,750 ft. to test promising oil showings in both the Marmaton lime, topped at 4,305 ft. (—1,183 ft.), and the Lansing lime, topped at 4,180 ft. (—1,058 ft.). A 60-minute drill-stem test at 4,515-40 ft. in the Marmaton yielded 30 ft. of heavily oil-cut mud and 45 ft. of oil and gas-cut mud with a bottom-hole pressure of 1,250 psi. A 30-minute test of the Lansing at 4,180-95 ft. got 30 ft. of oil-cut mud with some free oil. Top of the Mississippian was logged at 4,855 ft. (—1,733 ft.).

The location, 70 miles northwest of nearest Kansas production (Adell pool in Sheridan County), is on the southeast edge of the Denver-Julesburg basin, which extends across the northwest tip of the state. It is 4 miles south of the Nebraska line and 20 miles east of the Colorado line.

Murfin Drilling Co. 1 Batman, SE SW SE 12-21-13, 1 mile northwest of the Mueller pool, Stafford County, swabbed 32 bbl.

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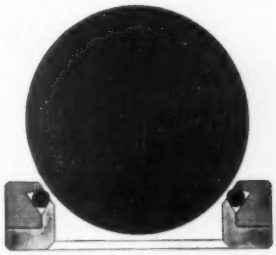

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of oil in 2 hours while starting tests of Arbuckle lime, topped at 3,522 ft. (—1,659 ft.). Hole is open at 3,523-31 ft.

KANSAS SUCCESSFUL WILDCATS

Barton County: GMR 1 Stark, NE NE NW 32-19s-12w, pumped 168 bbl. oil from Arbuckle at 3,385-88 ft., TD; Heebner 2,984 ft., lime 3,101 ft., Lansing-Kansas City 3,119 ft., Sooy 3,370 ft., elev. 1,817 ft.

Cowley County: Wiedeman 1 Pile-Koons, NE NW SW 31-31s-6e, pumped 18 bbl. oil from Bartlesville at 2,938-74 ft., TD; Cherokee 2,775 ft., elev. 1,373 ft.

Ellsworth County: B & R 1 Novotny, NW NE NE 32-16s-10w, pumped 48 bbl. oil from Arbuckle at 3,294-3,304 ft., TD; Heebner 2,863 ft., Dodge 2,881 ft., Douglas 2,901 ft., lime 2,970 ft., Lansing-Kansas City 2,989 ft., elev. 1,825 ft.

Gove County: Cities Service 1 Coberly, NW SE SE 15-14s-29w, pumped 3,000 bbl. 30.5°-gravity oil from Marmaton at 4,287-98 ft., TD 4,644 ft., Topeka 3,484 ft., Heebner 3,714 ft., Dodge 3,736 ft., Lansing-Kansas City 3,754 ft., cherty Sooy 4,385 ft., Mississippi lime 4,393 ft., Viola 4,554 ft., Arbuckle 4,610 ft., elev. 2,638 ft.

Greenwood County: Inland 1 Mignot, NW NW NW 9-22s-11e, pumped 5 bbl. oil from Bartlesville at 1,921-31 ft. and 1,950-61 ft., TD 1,974 ft.

McPherson County: Aladdin 1 Goering, SW SW SW 4-21s-1w, 2,100,000 cu. ft. gas from 2,955-59 ft., 2,965-78 ft., and 2,985-90 ft., TD 3,556 ft., Douglas 2,095 ft., Lansing-Kansas City 2,319 ft., Mississippi chert 2,931 ft., Mississippi lime 2,936 ft., Viola 3,422 ft., Simpson 3,454 ft., Arbuckle 3,539 ft., elev. 1,496 ft.

Stafford County: Armer 1 Anderson, NW NW SW 2-21s-12w, pumped 14 bbl. oil from Arbuckle at 3,461-66 ft., TD; anhydrite 628 ft., Heebner 3,062 ft., lime 3,196 ft., Lansing-Kansas City 3,206 ft., Simpson 3,420 ft., elev. 1,853 ft.

Petroleum, Inc. 1 Lincoln, NW SE SE 29-21s-14w, pumped 1,674 bbl. oil from Lansing at 3,543-51 ft., TD 3,849 ft., Heebner 3,294 ft., lime 3,412 ft., Sooy 3,699 ft., Viola 3,705 ft., Simpson 3,745 ft., Arbuckle 3,799 ft., elev. 1,942 ft.

Wabaunsee County: Carter 1 Whear, NW SE NE 10-15s-11e, pumped 60 bbl. oil from Simpson at 3,230-34 ft., TD; Howard 787 ft., Topeka 861 ft., Heebner 1,170 ft., Lansing 1,460 ft., Kansas City 1,621 ft., Mississippi lime 2,463 ft., Kinderhook 2,859 ft., Hunton 2,999 ft., Maquoketa 3,065 ft., Viola 3,131 ft., Decorah 3,212 ft., elev. 1,431 ft.

KANSAS WILDCAT FAILURES

Barber County: National Associated Petroleum 1 House, SW SW NW 15-30s-12w, dry, TD 4,741 ft.

Barton County: Brack 1 Moore, NW NW NW 7-17s-15w, dry, TD 3,596 ft.

Branine-Holl 1 Blodgett, SE SE SW 11-18s-11w, dry, TD 3,337 ft.

Butler County: Val Jean, Inc. 1 Pletcher, SE SE SW 13-26s-7e, dry, TD 2,755 ft.

Cowley County: Murfin et al 1 Aker, SW SW SW 6-32s-6e, dry, TD 2,350 ft.

Ellis County: Jones-Shelburne & Farmer 1 Jensen, SW SW NW 36-12s-18w, dry, TD 3,680 ft.

Davis-Transit 1 Mermis, SE SE SE 10-13s-19w, dry, TD 3,780 ft.

Ellsworth County: Continental 1 Hodgson, SE SE SE 5-17s-8w, dry, TD 3,382 ft., strat test.

Graham County: Peel-Hardman 1 Robinson, NW NW NW 20-9s-23w, dry, TD 4,368 ft.

Lyon County: Stanolind et al 1 Larson, NE NE NE 35-16s-10e, dry, TD 3,220 ft.

Marion County: Crest Petroleum 1 Turner, SW SW NW 34-19s-3e, dry, TD 2,831 ft.

Phillips County: Imperial-Bay 1 Schermerhorn, SE NE SE 7-1s-17w, dry, TD 3,600 ft.

Pottawatomie County: Wentworth 1 Moser, SE SE SW 33-6s-9e, dry, TD 1,818 ft.

Russell County: Dizdar Investment 1 Witt, NW NW NE 6-14s-13w, dry, TD 3,353 ft.

Sedgwick County: Gaty 1 Woulfe, SE SW NE 12-25s-1e, dry, TD 3,012 ft.

Stafford County: Adair 1 Rugan, NW NW NW 4-21s-11w, dry, TD 3,407 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Richardson County: Polinski 1 Schroeder, SW SW SE 22-2n-15e, dry, TD 2,572 ft.

Oklahoma

Sholem Alechem Outpost Shows for Springer Well

THE Springer zone is showing promise of important production in another southern Oklahoma wildcat, Stephens Petroleum Co. 1 Haas, NW SE NE 9-2s-3w, 2½ miles northwest of Fox, Carter County. In a 60-minute drill-stem test of the Humphreys sand zone (Springer), logged at 6,404-62 ft., the well flowed gas within 8 minutes and had oil at the top withing 53 minutes after the tester was opened. Approximately 1,610 ft. of clean 42.6°-gravity oil, plus 300 ft. of muddy oil and oil-cut mud, was recovered in the breakdown. Gas flow during the test was estimated at 250,000 cu. ft. per day. Oil fill-up was at an estimated rate of 50 bbl. per hour. Bottom-hole pressure was 675 psi. and shut-in pressure 1,675 psi. after 50 minutes. Hole is being deepened to penetrate all the Springer section.

Location of the discovery is about a mile west of shallower production in the Sholem Alechem field in the area between that field and the Fox-Graham pool.

In the same county, Van-Grisso Oil Co. and associates are opening a new, shallow, Tussey-sand pool at their 2 Elenora Killingsworth, SW SW NE 13-2s-5w. The well flowed 105 bbl. of oil through open tubing in 13 hours. Casing is perforated at 2,056-90 ft. Total depth is 2,751 ft. with 7-in. casing at 2,420 ft. Location is off the south flank of the Velma field.

The abandoned West Noble pool in McClain County has prospects of new production where Carter Oil Co. found good saturation and showings in McLish sand, a new and deeper pay zone for the pool at its 2 N. R. Johnson, C SW NE 30-8n-2w. In a 60-minute drill-stem test at 8,640-95 ft., the well had gas at the top within 14 minutes after the tester was opened. When tester was being pulled, oil tried to flow. Recovery in the breakdown totaled 6,150 ft. of oil (32° gravity) and 1,305 ft. of oil and gas-cut water. Flowing pressure during the test was 2,900 psi.

Harry H. Diamond 1 Dixon, SE SE SE 9-3n-1e, a wildcat located 3 miles west of the East Pauls Valley pool, Garvin County, flowed clean oil in a drill-stem test of a basal Pennsylvanian sand at 3,433-60 ft. Oil was at the surface within 40 minutes after the tester was opened. Recovery in the breakdown was 600 ft. of free oil with 270 ft. of salt water.

Additional pay zone has been opened in Carter Oil Co.'s deep discovery well, 1 Garrett, north of Mayfield, in northwestern Beckham County. Casing perforations now extend from 10,275-95 ft. Below bottom of casing at 10,297 ft., there is 7 ft. of open hole. At last report the well swabbed 210 bbl. in 24 hours.

OKLAHOMA SUCCESSFUL WILDCATS

Creek County: Barnes 1 Fenton, NE SW SW 9-16n-8e, pumped 23 bbl. oil from third Bartlesville at 2,860-73 ft., TD; Oswego 2,237 ft., Prue 2,300 ft., Verdigris 2,360 ft., Skinner 2,465 ft., lime 2,593 ft., Red Fork 2,642 ft., Inola 2,753 ft., first Bartlesville 2,767 ft., second Bartlesville 2,801 ft., elev. 875 ft.

Mizel Bros. 1-A Estate Land Co., SW NW NW 1-16n-9e, flowed 87 bbl. 34°-gravity oil from Dutcher at 2,898-2,903 ft., TD; Red Fork 2,292 ft., elev. 873 ft.

Hughes County: Skelly 1 Lyons, NW SE NW 33-6n-10e, flowed 722,000 cu. ft. gas from second Gilcrease sand at 4,103-12 ft., TD 5,461 ft., Thurmond 1,071 ft., first Booch 2,688 ft., second Booch 2,810 ft., third Booch 2,880 ft., Hartshorne 3,055 ft., Atoka 3,117 ft., Gilcrease (?) 3,900 ft., Wapanucka 4,200 ft., Union Valley 4,541 ft., Mississippian Caney 5,000 ft., Mayes 5,370 ft., elev. 873 ft.

Lincoln County: Thompson & Harris 1 Gibbons heirs, NW NE SW 17-14n-5e, flowed 154 bbl. 48°-gravity oil from Prue sand at 3,556-66 ft., TD; Hogshooter 2,398 ft., Checkerboard 2,711 ft., conglomerate 2,765 ft., Oswego 3,478 ft., coal 3,512 ft., elev. 885 ft.

Republic Natural Gas 1 Stewart, NE NE SW 19-14n-5e, flowed 79 bbl. 45°-gravity oil from Prue at 3,610-14 ft., TD 4,860 ft., Oswego 3,543 ft., Cherokee 3,568 ft., Verdigris 3,692 ft., lime 3,870 ft., Inola 4,024 ft., lime 4,148 ft., Mississippi lime 4,316 ft., Woodford 4,538 ft., Hunton 4,582 ft., Sylvan 4,648 ft., Viola 4,738 ft., dolomite 4,778 ft., first Wilcox 4,810 ft., second Wilcox 4,845 ft., elev. 915 ft.

Pawnee County: Reliable Oil and Swift Bros. 1 Manus, SE SE NE 19-20n-9e, flowed 125 bbl. 39°-gravity oil from Red Fork at 2,155-65 ft., TD; hard lime 438 ft., lime 614 ft. and 665 ft., sand 1,035 ft., Checkerboard 1,307 ft., broken sand 1,390 ft., Big lime 1,752 ft., Oswego 1,790 ft., elev. 699 ft.

OKLAHOMA WILDCAT FAILURES

Beaver County: Sunray 1 Hennigh, C NW NE 13-6n-27ecm, dry, TD 6,678 ft.

Carter County: Stanolind 1 Woerz, NW SE NW 31-4s-1e, dry, TD 8,211 ft.

Gibson 5 Lamb, NE NE NE 32-4s-2w, dry, TD 135 ft.

Cotton County: Ross and Palmer 1 Byars, N/2 NE SW 30-5s-12w, dry, TD 1,892 ft.

Grady County: Wegener 1 Teter est., SW NW NE 19-3n-5e, dry, TD 5,375 ft.

Hughes County: Horwitz 1 Altmeyer, SE NE NW 16-8n-9e, dry, TD 3,488 ft.

Stephens Petroleum 1 Ambrister, SE SE NW 7-8n-10e, dry, TD 4,452 ft.

Jackson County: Davenport Drilling 1 Ethridge, EW SW SW 30-2n-28w, dry, TD 1,190 ft., no log.

Kay County: Amerada 1 Tindell, SE SW SW 21-26n-3e, dry, TD 3,681 ft.

Lincoln County: Nye 1 Gaston, SE SE NW 1-13n-5e, dry, TD 3,460 ft.

Major County: Mazda 1 Batman, NE NW NE 13-21n-11w, dry, TD 7,300 ft.

Murray County: Carlock 1 Lewis, NW NW SE 32-1n-2e, dry, TD 4,055 ft.

Muskogee County: Lucas 1 Oliver, SW NE SE 25-14n-19e, dry, TD 240 ft.

Okmulgee County: King 1 Turner, SE NW SW 3-13n-11e, dry, TD 2,305 ft.

Seminole County: Lewis & Mucher 1 Anderson, SW SE SW 4-9n-8e, dry, TD 2,181 ft.

Stephens County: Christie-Stewart 1 Woodard, SE NW NE 29-2s-6w, dry, TD 2,765 ft.

Christie-Stewart 2 Woodard, SW SW NW 29-2s-6w, dry, TD 2,658 ft.

Gay 1 Beaver, NE SE SE 8-3s-6w, dry, TD 1,493 ft.

Woods County: Jackson Co. 1 McNally, C NW NE 35-25n-15w, dry, TD 7,717 ft., Herrington 2,655 ft., Oread 4,015 ft., upper Layton 5,280 ft., Hogshooter (?) 5,665 ft., Oswego 5,990 ft., Chester 6,250 ft., Mississippi lime 6,397 ft., Woodford 7,235 ft., Hunton 7,316 ft., Sylvan 7,352 ft., Viola 7,458 ft., second Wilcox 7,702 ft.

South Louisiana

Sohio's New Discovery Shut in Awaiting Storage

NEW ORLEANS.—West Baton Rouge Parish's new gas-condensate discovery has been shut awaiting storage. The well, Sohio Petroleum Co. B-1 A. Wilbert & Sons, 31-7s-11e, located on the Grosse Tete prospect, flowed 2,400,000 cu. ft. of gas daily plus 65 bbl. of condensate through 12/64-in. choke. Production is through casing perforations at 10,030-36 ft. Gravity of the condensate was 52.6°.

Production at the new Clovelly field, Lafourche Parish, has been confirmed at Superior Oil Co.-Clovelly Corp. 2 Clovelly

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Corp., 33-18s-22e. This second test in the field is bottomed at 13,070 ft. and 7-in. production string is cemented on bottom. The well flowed at the rate of 154 bbl. of 30.5°-gravity oil daily through perforations at 12,790-12,815 ft. Gage was run using 7/64-in. top and 5/8-in. bottom chokes. On electric log, the well indicated oil sands at 12,068-12,242 ft., 12,298-12,304 ft., 12,540-54 ft., 12,700-14 ft., and 12,788-12,818 ft.

West Hackberry field, in Cameron Parish, has been extended at Stanolind Oil & Gas Co. 91 State Lease 42, 19-12s-10w. On initial test, the well flowed 122 bbl. of 40.7°-gravity oil daily through perforations at 4,514-26 ft. Tubing pressure was recorded at 425 psi. Hole is bottomed at 4,760 ft. with 5½-in. casing cemented at total depth.

On the west side of Iowa field in Calcasieu Parish, Louis J. Roussel logged 149 ft. of net oil sand at 1 Haggart, et al, 11-9s-7w. Operator has set production casing and is preparing to test the well. Sands were encountered at 10,022-72 ft., 10,600-41 ft., and 10,870-11,000 ft.Hole is bottomed at 11,015 ft.

SOUTH LOUISIANA WILDCAT FAILURE

Evangeline Parish: T. G. Markley 1 Bowman-Hicks, 32-2s-2w, dry, TD 12,028 ft.

California

San Joaquin Valley Gets Two Discoveries

LOS ANGELES.—Two discoveries, one a field opener and the other a new fault-block pool discovery, were recorded in the San Joaquin Valley region of California.

The new field discovery was made by Humble Oil & Refining Co. No. B-34 Kern County Land in the Pleito Creek area about 3½ miles southwest of Wheeler Ridge, making it the southernmost production in the valley. Drilled to 5,451 ft. and then redrilled to 4,387 ft., the wildcat was completed as a 50-bbl. pumper of 17°-gravity crude. It is located in Section 33-11n-21w.

In the Belgian anticline area of the McKittrick group, Pacific Western Oil Co. opened a new fault-block pool. Although apparently associated with the anticline, the new Oceanic sand pool is thought to be a separate accumulation. The well, 42 M.M.A. in Section 30-30s-22e, was completed flowing at the rate of 694 bbl. daily from 4,971-5,039 ft. On a later test, using a 30/64-in. bean, the well flowed 1,140 bbl. of 35.4°-gravity crude daily.

In Cuyama Valley, tubing was being run at R. B. Watkins 1 Luce in Section 14-11n-28w about midway between Russell Ranch and Morales Canyon production. Before laying down drill pipe, a 10-minute formation test at 4,561-4,715 ft. resulted in an 1,180-ft. rise of gas-cut mud in the pipe.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, Belgian anticline area, new Oceanic sand fault-block pool: Pacific Western Oil Co. 42-30 M.M.A., 30-30s-22e, flowed at rate of 694 bbl. daily through 30/64-in. bean, 35.7 gravity, cut 0.5 per cent, producing interval 4,971-5,039 ft., TD 5,039 ft., elev. 1,714 ft.

CALIFORNIA WILDCAT FAILURES

Fresno County, Avenal area: Dumm Bros. Petroleum Corp. 1 Kreyenhagen, 32-22s-16e, dry, Kreyenhagen shale 125 ft., TD 760 ft., elev. 1,574 ft.

Kern County, Mountain View area: L. O. Tarrant 1 MacDonald, 18-30s-29e, dry, Santa Margarita 4,443 ft., TD 4,503 ft., elev. 450 ft.

Wheeler Ridge area: Hancock Oil Co. 52-35 Kern County Land, 35-11n-20w, dry, TD 6,254 ft., elev. 1,450 ft.

Kings County, Reef Ridge area: Sunray Oil Corp. 68-9 Lynch-Mauren, 9-23s-17e, dry, TD 11,962 ft., elev. 1,088 ft.

Ventura County, Weldon Canyon area: Union Oil Co. 1 Weldon Canyon, 3-3n-23w, dry, TD 4,816 ft., elev. 550 ft.

Permian Basin

Gas Pocket Kicking Fluid In Midland County Wildcat

MIDLAND.—Wildcats in Midland and Upton County held top interest this week, with considerable speculation on the outcome of Moore Exploration Co. 1 A. R. Baumann, located 3 miles south of Midland.

The well was bottomed at 11,291 ft. at last report and operators were conditioning mud before attempting to drill ahead. Considerable gas pressure had been encountered, and it was said to be kicking some fluid out of the hole. Green, 46°-gravity oil was reported showing in the mud pits.

Elevation of 1 Baumann is 2,778 ft., and formation tops so far determined are Spraberry at 7,700 ft. and Dean at 9,080 ft. Drill-stem tests in the latter zone, continuing to 9,312 ft. all recovered gas, but apparently had only normal pressure. At total depth of 11,291 ft., operators believed the hole was in the top of a new formation which was producing the high-pressure gas, but had been unable to run tests or take samples.

West of the city of Midland, Ralph Lowe 1 Fasken topped the Pennsylvanian limestone at 10,452 ft., on elevation of 2,835 ft. A drill-stem test from 10,464-635 ft., open 3½ hours, recovered some 2,900 ft. of gas in the drill pipe and 160 ft. of slightly gas-cut drilling mud with no shows of oil.

In Upton County, Gulf Oil Corp. 1-H McElroy prepared to drill ahead following first drill-stem test in the Ellenburger from 12,210-52 ft. The tool was open 1 hour, which yielded 30 ft. of drilling mud with no shows. Top of the formation was logged at 12,216 ft. on elevation of 2,635 ft.

Cities Service Oil Co. 1-AM University, ½-mile south outpost to the Flat Rock Ellenburger discovery, drill-stem tested an unidentified section from 10,006-75 ft., recovering 150 ft. of heavily gas and distillate-cut mud plus 120 ft. of 50°-gravity oil.

Sohio Oil Co. 1 Hill, Ellenburger failure, continued testing back up the hole. Last reported perforations were from 8,991-9,075 ft., in the Wolfcamp.

Reagan County had a new Spraberry discovery and operators had requested the Railroad Commission to designate the well as the opener of the Weddell Spraberry field. The well is Blackwood & Nichols Co. 1 Weddell, located about 11 miles east of Spraberry production in the Benedum field.

The well was on potential test from open hole and from the lower Spraberry between 7,145-85 ft. following Hydrafrac treatment. At last report the well had made three 1-hour gages of 14 bbl. of oil, 11.7 bbl., and 11.7 bbl. Top of the lower sand section was 7,160 ft., on elevation of 2,656 ft. Total depth was 11,548 ft., in the Ellenburger, which carried water with no shows.

A new well in the Clairemont Strawn field of Kent County has extended production ¾ mile southeast. Sun Oil Co. 1-C Bilby Wallace was testing on pay at 6,734-48 ft. Flowing through ⅜-in. choke, it flowed 155 bbl. of oil and 8 bbl. of wash water in 12 hours.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crane County: Placid Oil Co. 1 E. A. Culberson, 16-6-H&TC, TD 3,315 ft., elev. 2,334 ft., pay 3,082 ft., pumped 83 bbl. 41°-gravity oil.

Dawson County: Amerada Petroleum Corp. 1 D. L. Adcock, 106-34-7n- D&SE, TD 10,888 ft., elev. 3,022 ft., Devonian 10,608 ft., flowed 883 bbl. 41°-gravity oil, ½-in. choke, TP 250 psi., GOR 422 cu. ft.

James H. Snowden 1-30 Carrie Dean, 30-1-J. Poitevent Sur., TD 8,634 ft., elev. 2,847 ft., Spraberry 6,508 ft. ,perf. 7,288-98 ft., pumped 160 bbl. 39°-gravity oil, GOR 325 cu. ft.

Glasscock County: Amerada 1 Bertie Boone, 45-36-2s-T&P, TD 7,900 ft., elev. 2,696

ft., Spraberry 6,898 ft., pay 6,921 ft., pumped 108 bbl. 35°-gravity oil.

Amerada 1 Eula A. Woody, 10-36-3s-T&P, TD 8,390 ft., elev. 2,580 ft., Spraberry 6,804 ft., pay 8,843 ft., pumped 100 bbl. 35°-gravity oil.

Kent County: Kewanee Oil Co. 1 Wil "E," 3-5-H&GN, TD 7,300 ft., elev. 2,328 ft., lime 6,954 ft., perf. 7,377-7,831 ft., flowed 894 bbl. 38°-gravity oil, 48/64-in. choke, TP 1,020-75 psi., GOR 201 cu. ft.

Pecos County: G. H. Vaughn 1 Iowa Realty, 27-10-H&GN, TD 8,323 ft., elev. 2,539 ft., PB 6,881 ft., McKee 6,785 ft., 3,300,000 cu. ft. gas ⅜-in. choke.

Schleicher County: G. W. Strake 1 J. Forrest Runge, 66-M-GH&SA, TD 5,633 ft., reef 5,547 ft., perf. 5,611-26 ft., flowed 820 bbl. 40°-gravity oil, 24/64-in. choke, TP 480 psi., GOR 636 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Concho County: Northern Ordnance 1 Dee Green, J. H. Gibson Sur., dry, TD 2,085 ft.

Progress Petroleum Co. 1 Marion Sanson Co., Sec. 328, L. Steinbrink Sur., dry, TD 3,800 ft., elev. 1,708 ft., Strawn 2,740 ft., Caddo 3,075 ft., Ellenburger 3,515 ft.

Gaines County: Stanolind Oil & Gas Co. 1-B Nick Alley, 18-A27-PSL, dry, TD 4,766 ft., elev. 3,433 ft., San Andres 4,399 ft.

Garza County: Continental Oil Co. 4 Swenson, 43-2-H&GN, dry, TD 7,058 ft., elev. 2,364 ft., San Andres 1,560 ft., reef 6,861 ft.

Howard County: L. H. Armer et al 2-B McAdams, 26-32-3n-T&P, TD 4,665 ft.

Pecos County: D. G. Ash 1 Ash & Weatherford, 5-194-GC&SF, dry, TD 587 ft.

Brown & Thorp Drilling Co. 1 Gulf-State, 12-9-H&GN, dry, TD 2,144 ft.

R. E. Finch 1 Iowa Realty, 27-10-H&GN, dry, TD 1,569 ft.

Maner Graham 1 R. N. Thompson, 1-11-H&GN, dry, TD 2,305 ft.

H. H. Hamilton 1 Pecos County Water Improvement, 11-9-H&GN, dry, TD 248 ft.

Terry County: V. A. Brill 1 G. B. Sloss, 106-T-D&W, dry, TD 11,021 ft., elev. 3,345 ft., Spraberry 7,496 ft., lower Spraberry 8,186 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—West of the Dollarhide field in Andrews County, Texas, Skelly Oil Co. 1-J Mexico-State in 32-24s-38e, had a show of oil and gas in an unidentified formation. A drill-stem test was run from 3,700-3,820 ft., with the tool open 3 hours. Gas showed in 40 minutes and recovery was 90 ft. of oil and gas-cut mud estimated to be about 20 per cent oil, and 750 ft. of mud which was estimated to be 80 per cent oil and the balance mud.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Sinclair Oil & Gas Co. 1 State 464, 16-26s-36e, dry, TD 4,149 ft., elev. 2,951 ft., Yates 3,340 ft.

Appalachian-Ohio

Garrett County Wildcat Completed as Gasser

PITTSBURGH.—In Garrett County, Maryland, Delaware Gas Co. 1 Holloway, elevation 2,405 ft., was completed for 150,000 cu. ft. of gas in chert at 3,217-19 ft. and 3,227 ft., total depth 3,240 ft. Columbian Carbon Co. 1-GW-1505, elevation 2,529 ft., topped Oriskany sand at 4,038 ft. Gas in this formation tested 73,000 cu. ft. Drilling is at 4,118 ft. Eberly & Snee 1 Floyd Artes, elevation 2,404 ft., tested 705,000 cu. ft. of gas after acidizing in chert.

In Napier Township, Bedford County, Pennsylvania, South Penn et al are ready to resume drilling in 1 Jesse B. Miller after recovering fish.

In Williamsburg district, Greenbrier

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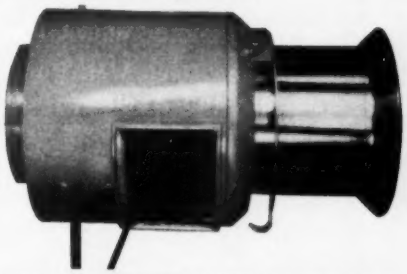

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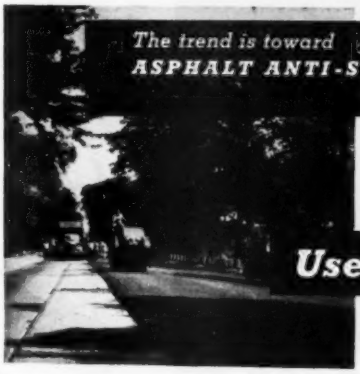

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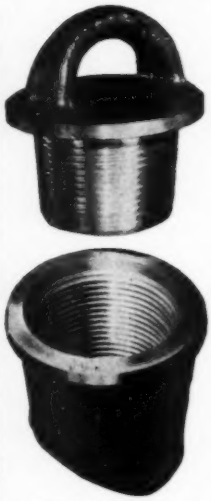

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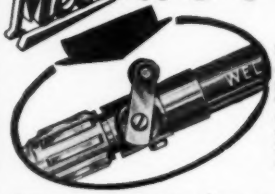

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County, West Virginia, Deep Rock Oil Corp. 1 Bertha H. Thornbury, et al, elevation 2,420 ft., is drilling at 746 ft. Clover district, Tucker County, Hope Natural Gas Co. 9384 Herbert Shaffer elevation 2,401 ft., drilling at 4,159 ft. Steele district, Wood County, Godfrey L. Cabot, Inc., 1-1345 Sarah E. Singledecker, elevation 886 ft., topped the Corniferous lime at 4,938 ft. and is drilling at 4,960 ft.

MARYLAND SUCCESSFUL WILDCAT

Garrett County: Delaware Gas Co. 1 Holloway (Lot), elev. 2,405 ft., 150,000 cu. ft. gas, chert 3,198 ft., gas 3,217-19 ft. and 3,227 ft., TD 3,240 ft.

OHIO

COLUMBUS.—Preston Oil Co. has completed two producers in New Castle pool in Coshocton County. The 5 Charles Mossholder, third quarter, logged the Clinton at 3,192-3,224 ft. with a 12-bbl. pay at 3,217 ft. After shot, 57 bbl. was swabbed out in 24 hours. Two miles to the east, 1 Charles Richards came in with good oil showings and made 75 bbl. in 24 hours after shot.

Frank Lyons et al 2 Fox, Lot 6, will be the group's fourth attempt to develop a gas pool in the northeastern part of Rootstown Township, Portage County. Two south offsets to the discovery well have been dry.

Illinois-Ind.-Ky.

Guffie Pool Outposts Show for Production

TWO outpost tests, located about a mile apart in the Wyman area, north of the Guffie pool, in northern McLean County, near the Daviess County line, western Kentucky, have encountered promising indications of production, one in the Jackson, and the other in the Hardinsburg sand. Both wells were drilled by G. L. Reasor and have casing run on their respective pay zones for completion.

That operator's 1 Stanley Pinkston, near the center of the NE SW 7-N-27, a mile east of Wyman, is the prospective Jackson sand producer with pay at 1,792-1,806 ft. Approximately 300 ft. of clean oil and 50 ft. of oil-cut mud was recovered following a 2-hour drill-stem test. No water was indicated. Bottom-hole pressure was 640 psi. There also was a substantial showing of gas. Casing was cemented 1 ft. in the top of the pay.

About 1 mile to the east in the SE SW SW SW 8-N-27, the same operator's 1 E. M. Pinkston logged rich oil saturation in the Hardinsburg sand at 1,626-33 ft. No test was made, but casing has been run to the top.

Production of the Spottsville pool, about a mile southwest of the town of the same name, and 8 miles east of Henderson, in Henderson County, Kentucky, has been extended ½ mile northeast with the completion by R. E. Hupp of his 1 Kernay, SE SE SW NW 21-Q-25. The well pumped and flowed 200 bbl. of clean oil in the first 24 hours but settled to 84 bbl. per day. Pay zone is the lower O'Hara, opposite which casing is perforated at 2,142-48 ft. Total depth is 2,274 ft. The well also had good showings in the Aux Vases sand at 2,060-66 ft.

About 2½ miles to the south and ½ mile south of production of the Zion pool, same county, Joe Blalack 1 M. B. Quinn Heirs, SW NW NE 9-P-25, pumped and flowed 400 bbl. of oil daily while completing in McClosky lime at 2,165-79 ft. A mile to the north in the Zion pool, F. M. Ashby and associates 1 Gregory, SE NE NE 2-P-25, pumped 35 bbl. of oil in 12 hours from Waltersburg sand, a new pay zone for the pool. Total depth is 1,420 ft.

Howard D. Atha 1 Davis, SE SW SE 33-6s-6e, ½ mile south of the Walpole pool, southern Hamilton County, Illinois, flowed clean oil in a drill-stem test of Aux Vases sand at 3,175-90 ft. Tester was open 60 minutes. Gas flowed in 14 minutes and oil in 58 minutes. Casing has been run to the top of the pay. The spot is about a mile north of the town of Walpole, about 9 miles south of McLeansboro.

Two miles east of production of the Calhoun pool, 6 miles south of Olney, in southern Richland County, Illinois, George & Wrather Drilling Co. 1 Mina Beach, NW SE NW 10-2n-10e, acidized its prospective O'Hara lime pay zone at 3,247-54 ft. and swabbed initially at the rate of 12 bbl. of oil per hour. Production later dropped to around 3 bbl. per hour.

About 1½ miles to the southwest in the N½ NE SE 8-2n-10e, same county, John B. Murvin 1 Arteberry swabbed 75 bbl. net oil with 345 bbl. of water per day while testing McClosky lime, opposite which casing is perforated at 3,187-3,210 ft. This is an old hole drilled in 1938. Total depth is 3,245 ft.

A ¾-mile southwest extension of the Caborn pool, 4 miles northeast of Mount Vernon, Posey County, Indiana, is indicated at Ward W. Dayton 1 Rueger, SE SW NE 36-6s-13w, where casing has been run to test good saturation found in Cypress sand at 2,357-69 ft. A drill-stem test with tool open 60 minutes yielded 90 ft. of gas, 140 ft. of oil, and 40 ft. of oil-cut mud. Bottom-hole pressure was 840 psi.

ILLINOIS SUCCESSFUL WILDCATS

Clay County: W. W. Toler 1 Manker, SW NE SE 17-3n-8e, IP 42 bbl., Aux Vases 2,912-30 ft., TD 2,930 ft.

Effingham County: Robinson - Puckett 1 Becker, NW NW SE 23-6n-6e, IP 35 bbl., Rosiclare 2,675-80 ft., TD 2,680 ft.

Wabash County: George P. Ellison 1 Epler, NE SE NE 36-1s-14w, IP 160 bbl., O'Hara 2,834-43 ft., TD 2,846 ft.

Washington County: E. A. Obering 1 Baldwin, NE SE SE 15-1s-4w, IP 56 bbl., Silurian 2,323-36 ft., TD 2,336 ft.

ILLINOIS WILDCAT FAILURES

Bond County: James C. Nickerson 1 Harnetiaux, SE SE NW 34-4n-3w, dry, TD 1,147 ft.

Clay County: Tuley & Carter 1 Dillman, NE SE SW 9-4n-6e, dry, TD 2,894 ft.

Fayette County: R. W. Slemaker 1 Williams, NW NE SW 28-6n-3e, dry, TD 2,114 ft.

Gallatin County: J. B. Buchman-C. E. O'Neal 1 Moye, NE NW NE 25-7s-8e, dry, TD 3,054 ft.

Oil Management, Inc., 1 Reder, NE SE SE 27-8s-9e, dry, TD 2,805 ft.

Jefferson County: The Texas Co. 1 Hartley, NE SW SW 15-1s-1e, dry, TD 2,401 ft.

Bolin & Appleby 1 Lankford, NE NE SW 16-4s-4e, dry, TD 3,307 ft.

Marion County: J. M. Miller 1 Corurson, Trustee, SW SW SE 22-3n-3e, dry, TD 2,580 ft.

Perry County: E. M. Mullins 1 Chapman, SE SE SW 10-4s-1w, dry, TD 1,660 ft.

Shelby County: The Texas Co. 1 Craig, SW SW NW 24-11n-3e, dry, TD 2,015 ft.

Wabash County: D. Lyle Sieterle 1 Bruner, NE NW NW 14-1n-12w, dry, TD 1,657 ft.

J. F. Balderson 1 Liddle, SE NW NE 26-1n-13w, dry, TD 1,752 ft.

Wayne County: Ward W. Dayton 1 Siegert, SW SW NE 35-1n-9e, dry, TD 3,433 ft.

Walter Duncan 1 Smith, NW NE SW 17-1s-7e, dry, TD 3,320 ft.

INDIANA WILDCAT FAILURES

Clay County: Pure Oil Co. 1 Royer, SW SE NE 19-9n-6w, dry, TD 1,862 ft.

Daviess County: Art Wilson 1 Bennington, SW SW SE 4-4n-7w, dry, TD 1,391 ft.

Pike County: National Associated Petroleum Co. 1 Lemond, NW NW NE 36-1s-7w, dry, TD 1,240 ft.

Posey County: Stanword Oil Co. 1 Greathouse, SW SE NW 2-6s-14w, dry, TD 3,128 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Henderson County: R. E. Hupp 1 Kearney, SE SE SW NW 21-Q-25, IP 84 bbl., Aux Vases 2,142-48 ft., TD 2,277 ft. (extension Spottsville pool).

George Hoffman et al 1 Numley, NWc NE SE SW 19-P-25, IP 21 bbl., Benoist 2,098-2,106 ft., TD 2,353 ft. (extension Oak Grove pool).

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: W. Johnson et al 1 Greer, CEL SW SE NW 24-O-32, dry, TD 1,232 ft.

Henderson County: Howard Atha 1 McNeely, SEc NE SW NW 23-Q-20, dry, TD 2,638 ft. (Caney Mound outpost).

Craig Smith 1 Blair Minerals, SE NW NW 18-Q-12, dry, TD 2,347 ft.

Kingwood Oil Co. 1 Chase, SEc SE SE SE 9-Q-26, dry, TD 1,991 ft. (outpost Reed pool).

W. F. Lacy 1 Waller, SW SE SE SE 21-Q-26, dry, TD 2,095 ft.

C. E. Skiles 1 Jones, SE SE NW 3-O-25, dry, TD 2,525 ft.

Muhlenberg County: T. S. Drake 2 Craig Heirs, NE NE NE 3-H-31, junked hole, TD 1,002 ft.

Union County: D. C. Holman 1 Adamson, NW SE NE 8-N-18, dry, TD 2,840 ft.

EASTERN KENTUCKY

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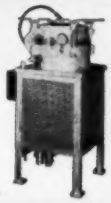

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B. F. Johnson, Pike County sector, 327,000 cu. ft. gas daily from Devonian black shale at total depth 3,612 ft.; 967 John E. Taylor, Pike County sector, 506,000 cu. ft. gas daily from Devonian black shale at total depth 3,442 ft.; 5969 J. B. Pigman, Knott County sector, 202,000 cu. ft. of gas daily from Big Lime (Mississippian) and Devonian shale. All wells were shot.

In Breathitt County and on North Fork of Kentucky River, two producers have been established in the Corniferous lime. The 1 Mount Carmel Mission School had Big Lime at 500 ft. and Corniferous at 1,396 ft. Drilled to a total depth of 1,410 ft., the well initialed for 300,000 cu. ft. gas daily with rock pressure of 420 psi. Well was not shot. Christian Mission 1 Christian Mission School at mouth of Whiteoak Creek of Kentucky River had 125,000 cu. ft. gas daily from Corniferous lime at 1,319-27 ft., total depth.

Canadian Fields

Stony Plain Venture Tests Natural Gas

CALGARY.—Royalite Oil Co., Ltd., and Associates have found a substantial flow of natural gas plus some gassy oil-cut mud during initial drill-stem tests run in the Devonian D1 zone at their well on the Stony Plain Indian Reserve of central Alberta. The well, Royalite-Stony Plain 2, in LSD 6, 23-52-26w4, ran three drill-stem tests with results as follows: 87-minute test from 4,257-77 ft. gave maximum natural gas flow rate of 2,250,000 cu. ft. daily with recovery of 10 ft. of gassy oil-cut mud; 1-hour test at 4,277-87 ft. had slight gas blow plus recovery of 10 ft. of drilling mud; 87-minute test from 4,294-4,316 ft. showed gas rate of 1,620,000 cu. ft. daily plus recovery of 50 ft. of gassy oil-cut mud. Crew is now making hole below 4,320 ft.

The Redwater Leaseholds Group ran two drill-stem tests in the upper portion of the Lower Cretaceous sands and found a small natural gas flow plus recovery of some oil and oil-cut mud at its current driller in the Campbell oil pool 7 miles northwest of Edmonton.

The well, Redwater Leaseholds-Campbell No. 11, in LSD 11, 28-54-25w4, is located ¼ mile west of No. 2 producer, in the northwest sector of Campbell. Drill-stem test from 3,683-93 ft. gave a maximum gas flow rate of 95,000 cu. ft. daily, with pipe recovery consisting of 340 ft. of oil and 40 ft. of oil-cut mud. Second test, from 3,693-3,703 ft., gave a slight air blow plus recovery of 60 ft. of oil-cut mud in 1 hour. Crew is currently coring below 3,703 ft. for tests of the second and lower sands of the Cretaceous.

Shell Oil Co. will run casing to near bottom of its 10,501-ft. deep Shell-MacKid 1, wildcat near Okotoks, to facilitate extended tests of several horizons. The venture is located in LSD 1, 19-21-28w4, around 18

(Continued on page 170)

Louisiana-Arkansas

New Zone Indicated in East Schuler Field

SHREVEPORT.—Striking pay and halting drilling at half the proposed depth, Atlantic Refining Co. 2 Bishop established Pettit pay in East Schuler field, southwest Union County. Located in NW SW 13-18s-17w, the well is a west offset to Kinard 1 Burns, a Smackover discovery, and Atlantic plans to drill two Smackover tests on the same tract. The 2 Bishop was perforated at 3,930-46 ft., and tested oil at the rate of 140 bbl. per day through 10/64-in. choke. Tubing pressure was 400 psi. Gravity of the oil was 44°.

In the Fouke area, Miller County, Skelly Oil Co. seems assured of a producer. The 1-B Durham, 21-16s-26w, was perforated between 3,859-3,979 ft. Recovery on a drill-stem test was 3,500 ft. of oil, some gas, and no salt water.

North Louisiana.—A gas blowout has been successfully curbed at Inland Oil Co. 1 Saucier, wildcat in 19-14n-10w, which is currently waiting on orders at 2,625 ft.

Two producers were added to Nebo-Hemphill field in LaSalle Parish. J. S. Michael Co.-Nebo Oil Co. L-1 Hudnall, 13-7n-3e, pumped 65 bbl. of oil from perforations at 4,007-12 ft. Total depth is 4,035 ft. H. L. Hunt 39 Louisiana Delta Hardwood Co. et al, 26-7n-3e, produced 22 bbl. of oil from perforations at 4,010-15 ft. Total depth is 4,243 ft.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Hilburn 1 Crystal-Bolinger, 1,503 ft. S and 635 ft. E NWc 6-22n-12w, dry, TD 2,787 ft.

Concordia Parish: Campbell et al 1 Turner, NE 53-8n-10e, dry, TD 6,200 ft.

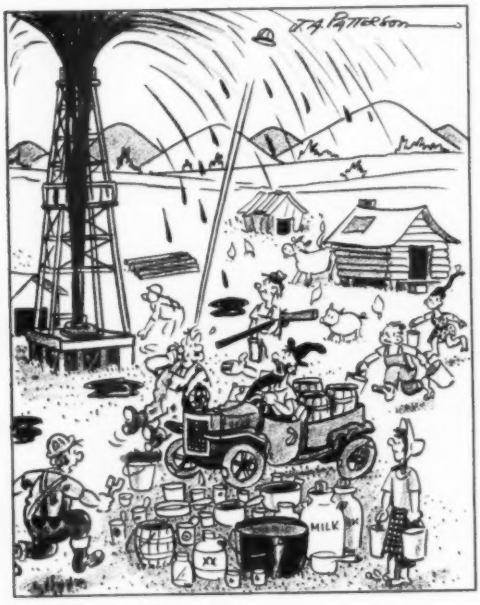
LaSalle Parish: Michael et al 1 Nebo Oil Co. "D," C NW NW 5-6n-3e, dry, TD 4,515 ft.

ARKANSAS SUCCESSFUL WILDCAT

Union County: Turner 1 Saxon, C W/2 Lot 2 NW 4-16s-16w, pumped 189 bbl. 46°-gravity oil from Travis Peak at 2,936-46 ft., TD 6,063 ft., OWWO.

ARKANSAS WILDCAT FAILURE

Union County: Bagley 2 Vines est., SE SE NE 29-18s-14w, dry, TD 3,963 ft., core test.



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In Canada: Peacock Bros., Ltd., Montreal, Quebec

April Drilling Down From March Records; Still Ahead of 1950

by Polly DeArmond

ALTHOUGH cumulative completions and footage still hold an edge over 1950, and the fact that operations during April approximated those of the same month of the previous peak year, drilling in April dropped off from the records set in March for the first part of this year. Total completions were off 188 wells, or 5.5 per cent, from March figures. Total footage drilled decreased about 1,650,000 ft., or 11.9 per cent.

Declines by Districts

Two divisions of the nation reflected notable declines in the April vs. March analysis. The Rocky Mountain region, including Montana, Wyoming, Colorado, Utah, and the Dakotas, slumped 20.9 per cent in completions (off 22 wells) and dropped 32.5 per cent in total depth drilled (down some 166,000 ft.). In the Southwestern section (made up of Texas and New Mexico), the following losses were recorded: completions down 270 wells, or 17.2 per cent; footage down 1,457,000 ft., or 20.2 per cent.

Decreases in both categories were reported for the West Coast in the April - March comparison. Wells were off 10, or 5.5 per cent, and footage was down 66,000 ft., or 9 per cent.

Shallower drilling was particularly marked in the Southern states of Louisiana, Arkansas, Mississippi, Alabama, Georgia, Florida, and Tennessee. Completions slipped only 4 wells, or 1.8 per cent, while footage dropped 187,000 ft., or 12.8 per cent. Evaluation of footage classification figures in this area for April compared with March show that the number of wells drilled to 7,500 ft. increased 9.6 per cent while total wells drilled from 7,500 ft. to more than 12,500 ft. decreased 18.9 per cent.

The Appalachian area reported slightly more wells but less footage. Completions in New York, Pennsylvania, West Virginia, and Maryland were up 4 wells, or almost 2 per cent. Footage declined 23,000 ft., or 5.7 per cent.

Increases in Two Areas

Oklahoma, Kansas, Nebraska, and Missouri (comprising the Mid-Continent division) showed a gain of 87 completions, or 11.4 per cent, over the preceding month. Total footage drilled in this area climbed 193,000 ft., or 7 per cent.

The North Central section (Ohio, Kentucky, Illinois, Indiana, and Michigan) increased 27 wells, or 7 per cent, with an accompanying gain of 56,000 ft., or 6.9 per cent.

SUMMARY OF COMPLETIONS . . . APRIL 1951

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	51	26	0	26	52	0	0	0	0	0	75,764	51
Pennsylvania	122	61	9	52	113	9	0	0	0	0	198,022	210
West Virginia	34	3	24	7	15	16	3	0	0	0	101,876	162
Maryland	1	0	1	0	0	1	0	0	0	0	3,488	18
Ohio	69	25	11	33	42	26	1	0	0	0	129,400	111
Kentucky	73	32	6	35	63	10	0	0	0	0	112,402	102
Illinois	138	59	0	79	51	87	0	0	0	0	348,028	240
Indiana	85	26	0	59	73	12	0	0	0	0	158,243	182
Michigan	47	13	2	32	27	20	0	0	0	0	115,094	116
Kansas	353	172	20	161	46	306	1	0	0	0	1,199,148	449
Neb., Mo., Iowa	16	2	1	13	7	6	3	0	0	0	54,616	27
Oklahoma	485	258	19	208	169	213	82	14	7	0	1,686,678	881
Texas	1,262	780	36	446	341	451	340	97	24	9	5,562,944	1,745
North	221	95	2	124	98	91	32	0	0	0	690,958	190
West Central	187	93	3	91	72	80	35	0	0	0	619,437	206
West	393	304	1	88	82	92	165	30	15	9	2,079,789	603
Panhandle	49	27	11	11	6	42	0	1	0	0	148,284	86
East	105	71	1	33	27	44	25	8	1	0	442,692	78
Gulf Coast	141	96	9	36	6	52	36	41	6	0	853,440	255
Southwest	166	94	9	63	50	50	47	17	2	0	728,344	327
Louisiana	148	80	11	57	29	38	20	22	34	5	954,857	258
Northern	79	42	8	29	25	34	13	4	3	0	310,550	114
Southern	69	38	3	28	4	4	7	18	31	5	644,307	144
Arkansas	35	19	0	16	9	20	1	4	1	0	138,407	25
Mississippi	21	12	0	9	0	1	10	7	3	0	148,119	27
Ala., Ga., Fla.	5	3	0	2	0	4	0	1	0	0	21,555	5
Tennessee	7	2	0	5	7	0	0	0	0	0	8,866	7
Montana	15	11	0	4	13	2	0	0	0	0	31,288	55
Wyoming	44	27	2	15	3	28	9	4	0	0	198,425	172
Colorado	22	7	1	14	4	3	15	0	0	0	103,811	57
Utah	0	0	0	0	0	0	0	0	0	0	0	23
Dakotas	2	0	0	2	0	0	2	0	0	0	11,166	3
Ariz., Idaho, Nev.	0	0	0	0	0	0	0	0	0	0	0	6
New Mexico	36	23	1	12	7	13	3	9	4	0	197,377	104
California	173	129	0	44	54	79	24	11	3	2	668,023	239
Total April 1951	3,245	†1,770	144	*1,331	1,125	1,345	514	169	76	16	12,227,597	‡5,275
Total March 1951	3,433	1,895	237	1,301	1,050	1,432	572	230	132	17	13,877,385	4,779
Total April 1950	3,249	1,896	174	1,179	1,227	1,247	543	149	70	13	11,846,878	4,871
Cumulative 1951	12,779	7,100	811	4,868	4,062	5,415	2,125	757	363	57	50,100,993	
Cumulative 1950	12,668	7,385	817	4,466	4,570	4,987	2,108	667	291	45	47,333,746	

*Incl. 106 service wells: N. Y. 26, Pa., 50, Ohio 6, Ill., 1, Ind. 1, Kans. 5, Okla. 11, No. Tex. 1, W. Cent. Tex. 1, S.W. Tex. 4. †Incl. 29 condensate wells: Okla. 4, W. Tex. 7, E. Tex. 7, Tex. Gulf 5, So. La. 3, Miss. 3. ‡Incl. wells rigged up and/or drilling at month end.

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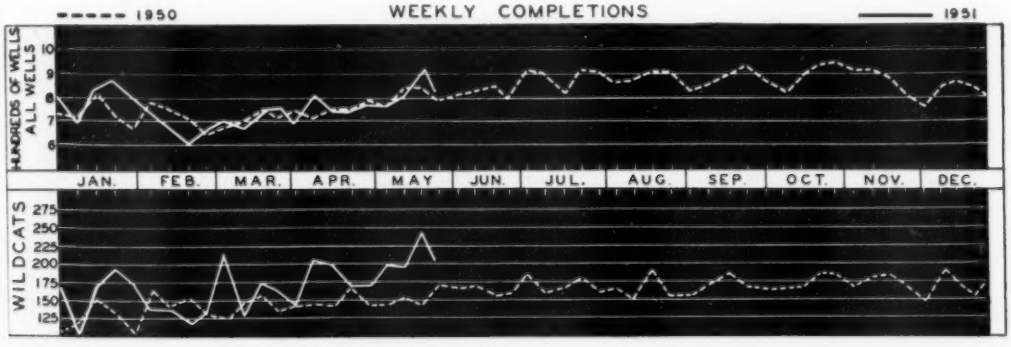
CURRENT STATISTICS

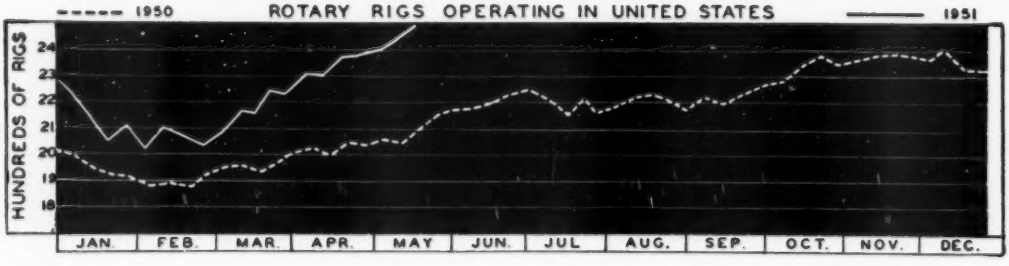
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED MAY 26, 1951

	Total of all wells					May 26		Wildcat completions and discoveries									
													Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	12	6	0	*6	17,484	169	205	0	0	0	0	0	0	0	0	0	0
Pennsylvania	15	6	4	†5	30,691	294	392	0	0	0	0	0	0	0	0	1	1
West Virginia	8	2	5	1	21,947	221	259	0	0	0	0	0	0	0	5	2	7
Ohio	21	5	5	‡11	40,357	332	362	0	0	0	0	0	1	0	3	12	16
Indiana	20	7	0	13	35,781	393	500	0	0	0	4	4	10	0	1	102	113
Kentucky	21	8	2	11	38,390	370	344	2	0	0	8	10	6	0	1	63	70
Illinois	46	13	0	33	115,634	703	894	4	0	0	14	18	17	0	0	138	155
Michigan	19	3	1	15	54,688	268	321	3	0	1	4	8	11	0	5	106	122
Kansas	107	45	15	§47	328,794	1,677	1,407	8	0	1	16	25	83	0	7	319	409
Nebraska	6	3	1	2	22,390	113	33	0	0	0	2	2	3	0	1	51	55
Oklahoma	131	66	7	¶58	473,204	2,229	2,065	5	0	1	19	25	78	1	12	294	385
Texas	288	168	17	103	1,287,869	6,506	6,317	15	0	3	65	83	286	26	49	1,260	1,621
North Central (Dist. 7-B & 9)	99	48	2	†49	291,282	1,980	1,970	5	0	1	27	33	138	0	7	536	681
West (Dist. 7-C & 8)	69	55	1	13	336,669	1,983	1,841	7	0	1	11	19	61	7	4	252	324
Panhandle (Dist. 10)	17	9	6	2	51,620	282	397	0	0	0	0	0	0	0	0	11	11
Eastern (Dist. 5, 6, & 6-P)	19	8	1	10	105,123	462	438	0	0	0	6	6	3	4	0	89	96
Gulf Coast (Dist. 2 & 3)	43	25	5	13	315,446	913	865	0	0	1	12	13	44	11	31	174	260
Southwest (Dist. 1 & 4)	41	23	2	16	187,729	886	806	3	0	0	9	12	40	4	7	198	249
Louisiana	38	18	2	18	239,326	782	970	0	0	0	5	5	19	0	4	104	127
Northern	22	13	0	9	85,840	389	409	0	0	0	4	4	5	0	3	58	66
Southern	16	5	2	9	153,486	393	471	0	0	0	1	1	14	0	1	46	61
Arkansas	6	5	0	1	17,094	146	150	1	0	0	1	2	5	0	1	29	35
Mississippi	4	2	0	2	23,518	110	134	1	0	0	2	3	6	3	0	40	49
Southeastern States	1	1	0	0	5,474	32	26	0	0	0	0	0	0	0	0	12	12
Montana	4	3	0	1	7,618	83	68	0	0	0	0	0	0	0	0	21	21
Wyoming	10	6	1	3	47,411	202	213	0	0	0	2	2	4	0	0	41	45
Colorado-Utah	5	2	1	2	21,310	99	28	1	0	1	2	4	3	0	3	48	54
New Mexico	14	5	7	2	55,823	266	263	0	0	0	1	1	7	0	5	32	44
California	46	36	2	8	174,085	825	663	1	0	0	6	7	18	0	1	164	183
Miscellaneous (1 Md., 1 Nev.)	2	0	1	1	8,357	19	6	0	0	1	1	2	0	0	10	8	18
Total United States	834	410	71	343	3,067,245	15,898	15,620	41	0	8	152	201	557	30	108	2,847	3,542
Total previous week	919	470	59	390	3,748,957	. .	. .	37	3	7	195	242	516	30	100	2,695	3,341
Total May 26, 1950	794	432	64	298	2,928,866	....	....	20	1	3	137	161	400	28	78	2,306	2,812

Service wells included: *6, †5, ‡2, §1, ¶3.





DAILY AVERAGE PRODUCTION FOR WEEK

	May 26 crude oil	B. of M. May demand	May 19 crude oil
Alabama	2,850	2,400	2,800
Arkansas	78,350	84,000	77,750
California	963,900	970,000	965,100
Colorado	72,300	78,000	74,200
Eastern	62,800	64,000	60,980
Florida	1,575	1,600	1,575
Illinois	166,800	163,000	166,000
Indiana	28,400	30,000	28,600
Kansas	310,850	303,000	316,350
Kentucky	27,100	30,000	27,100
Louisiana	613,125	632,000	610,875
North Louisiana	117,100		114,850
South Louisiana	496,025		496,025
Michigan	40,100	42,000	40,900
Mississippi	97,750	106,000	100,050
Montana	24,400	24,000	24,600
Nebraska	7,300	10,000	7,200
New Mexico	142,800	140,000	142,800
Oklahoma	502,050	505,000	505,650
Texas	2,750,875	2,500,000	2,750,875
Dist. 1 (Southwest)	33,825		33,825
Dist. 4 (Southwest)	257,800		257,800
Dist. 2 (Gulf Coast)	165,150		165,150
Dist. 3 (Gulf Coast)	482,875		482,875
Dist. 5 (Eastern)	52,450		52,450
Dist. 6 (Eastern)	113,500		113,500
East Texas field	272,700		272,700
Dist. 7-C (West)	96,600		96,600
Dist. 8 (West)	948,350		948,350
Dist. 7-B (W. Central)	85,875		85,875
Dist. 9 (N. Central)	153,150		153,150
Dist. 10 (Panhandle)	88,600		88,600
Utah	3,800	5,000	3,800
Wyoming	195,200	180,000	198,300
Total United States	*6,092,325	5,870,000	6,105,505
Change from prev. week, down	13,180		
Canada	155,895		154,485
Total U. S. production January 1-May 26			†870,997,855 bbl.
Same period last year (crude plus cond.)			729,097,380 bbl.

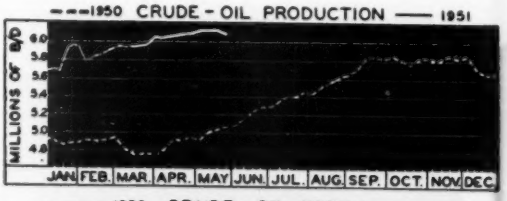
*Not including 109,480 bbl. condensate. †Including 15,703,415 bbl. condensate.

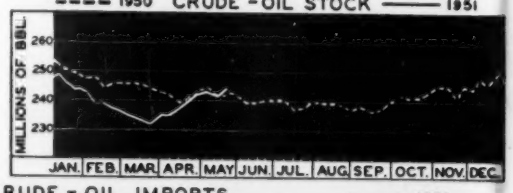
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

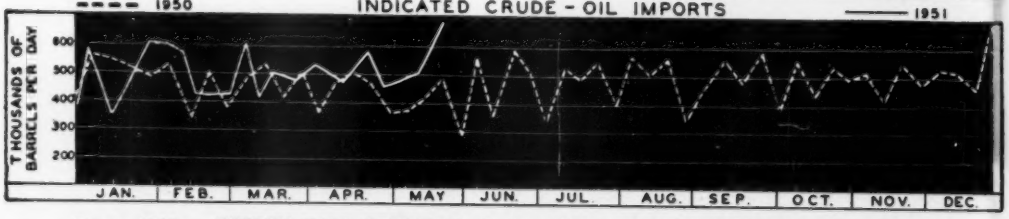
(Thousands of barrels)

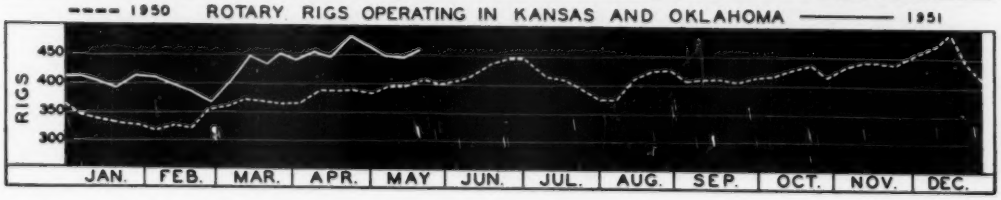
	May 19, 1951	May 12, 1951	May 20, 1950
Pennsylvania Grade	2,102	2,074	2,901
Other Appalachian	1,578	1,473	1,807
Illinois, Indiana, Michigan	10,667	10,684	9,019
Arkansas	2,424	2,538	2,923
Louisiana	14,067	14,179	15,193
North	2,766	2,791	3,522
Gulf	11,301	11,388	11,671
Mississippi	2,978	3,121	2,466
New Mexico	6,691	6,833	5,974
Oklahoma and Kansas	38,156	37,849	35,729
Texas	112,821	112,191	110,490
East Texas	14,149	13,795	14,995
West Texas	45,947	45,345	40,322
Texas Gulf	24,983	25,225	27,827
Other Texas	27,742	27,826	27,346
Rocky Mountain	14,458	14,133	13,344
California	30,410	30,175	36,886
Foreign	8,029	7,219	6,292
Total	244,383	242,469	243,024

*Bureau of Mines







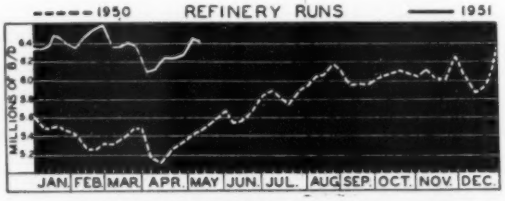


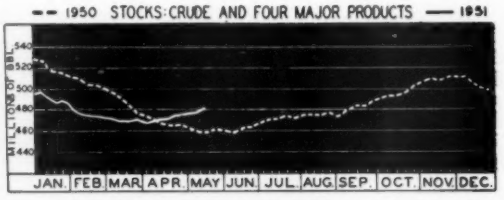
A.P.I. REFINERY REPORT, MAY 19

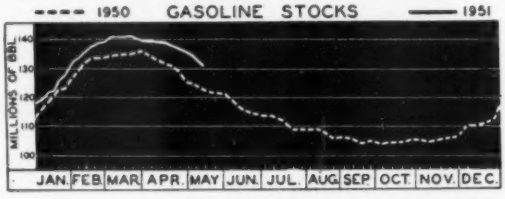
(Thousands of barrels)

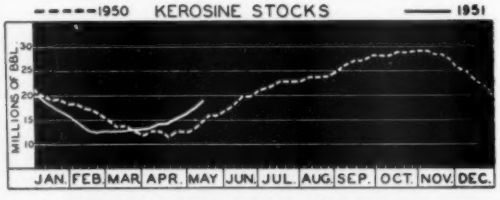
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, May 1950: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,045	371.7	52.3	219.3	213.2	27,085	7,529	14,896	9,344	928	377.5	36.2	187.7	206.2
Appalachian:														
District 1	103	47.9	6.1	16.3	11.7	2,948	370	560	289	97	41.0	6.1	12.3	11.2
District 2	73	29.3	3.9	10.3	16.6	1,310	137	245	181	73	33.9	4.6	8.1	13.9
Ind., Ill., Ky.	1,138	639.1	61.7	176.6	163.3	30,128	3,377	9,107	3,423	1,001	528.8	65.5	158.6	141.4
Okla., Kans., Mo.	512	259.8	22.6	106.4	62.0	15,573	1,023	5,404	1,101	495	268.0	21.5	96.3	57.7
Inland Texas	227	138.6	12.1	42.9	42.1	3,542	325	784	703	212	143.0	11.4	27.5	43.3
Texas Gulf Coast	1,594	703.8	130.3	320.8	277.2	20,213	2,912	5,891	4,303	1,155	551.8	92.6	240.8	201.4
La. Gulf Coast	489	234.7	57.9	121.7	64.9	6,821	1,865	2,545	1,210	473	231.2	55.1	93.0	57.1
N. La. and Ark.	81	29.0	7.9	18.9	8.1	2,871	341	747	71	72	25.3	7.0	13.8	12.0
Rocky Mountain:														
New Mexico	13	7.0		2.7	2.7	102	5	63	30	13	7.2	.2	2.4	3.4
Other Rocky Mtn.	207	103.3	5.4	39.3	41.7	5,409	225	1,223	647	163	76.3	4.0	31.9	30.2
California	923	413.9	18.4	118.1	403.4	16,740	616	7,361	15,921	853	363.4	11.6	125.0	285.2
May 19, 1951	6,405	2,978.1	378.6	1,193.3	1,306.9	132,742	18,725	48,826	37,223	5,535	2,647.4	315.8	997.4	1,063.0
May 12, 1951	6,460	2,994.6	355.0	1,147.9	1,279.4	134,522	17,740	47,056	36,557					
May 20, 1950	5,477	2,654.3	305.7	1,009.7	1,062.1	124,669	14,648	39,432	39,330					

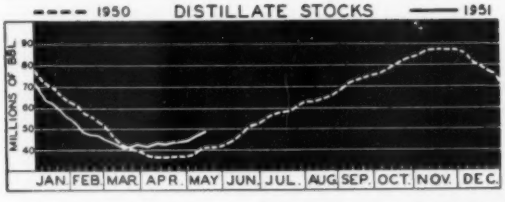
*At refineries including natural blended. †Finished and unfinished.

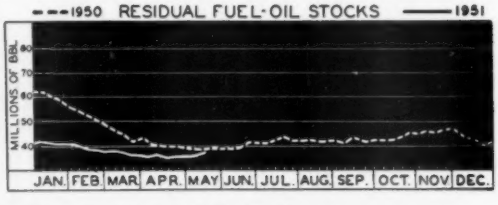


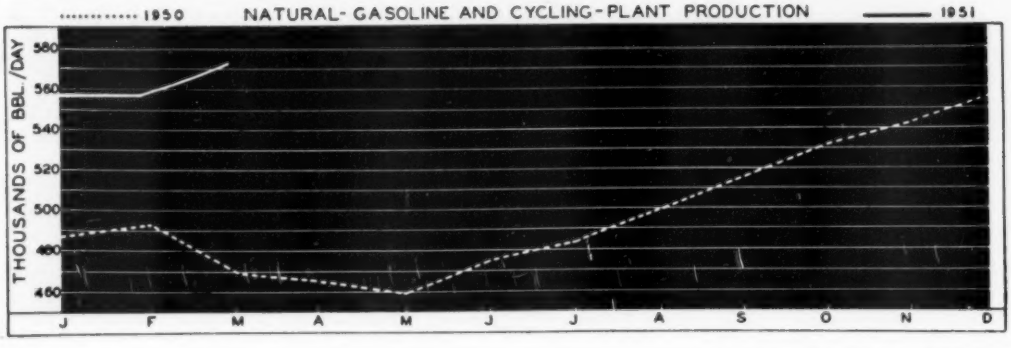












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.90
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

GASOLINE price postings for tank-wagon deliveries at points along the East Coast were rather completely muddled during the week ended May 26. For many weeks unconfirmed rumors have told of localized price cutting at service stations and discounts to dealers by suppliers.

Effective May 24, Sun Oil Co. reduced gasoline tank-wagon prices 1 cent per gallon in 13 eastern states and the District of Columbia. The company stated that prices were reduced to bring them more nearly in line with the price at which gasoline is being sold to dealers in Sun's eastern marketing area. By the end of the week, several other marketers had partially met the cut by reductions in selected areas. Others were reported studying the situation.

The mad scramble for East Coast gallonage at the consumer level can not be based on decreased sales. Neither can it be accounted for on a basis of too much gasoline in storage. Domestic demand has been running about 10 per cent greater than last year, while Gulf-East Coast stocks on May 19 were only 4.4 per cent above the same date last year. Primary stocks on the East Coast are low when compared with demand.

Definite indication that marketers are expecting a continuation of the tight residual market on the East Coast is found in the small number of bids received by the City of New York covering heavy fuel requirements for Board of Transportation and Board of Education. Lower tanker rates may result in additional movement of heavy fuel during the summer months, but current prices are not high enough to encourage higher yields of residual at refineries.

Further firming of gasoline prices on the Group 3 market is reported, resulting from additional increases in Mid-Continent sales. Spotty, under-the-market sales continue for kerosine and No. 2 fuel.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of May 28, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10	8½-9
No. 2 straw fuel oil	8-8⅝	9	7½-8
No 6 residual	$1.75-1.80	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

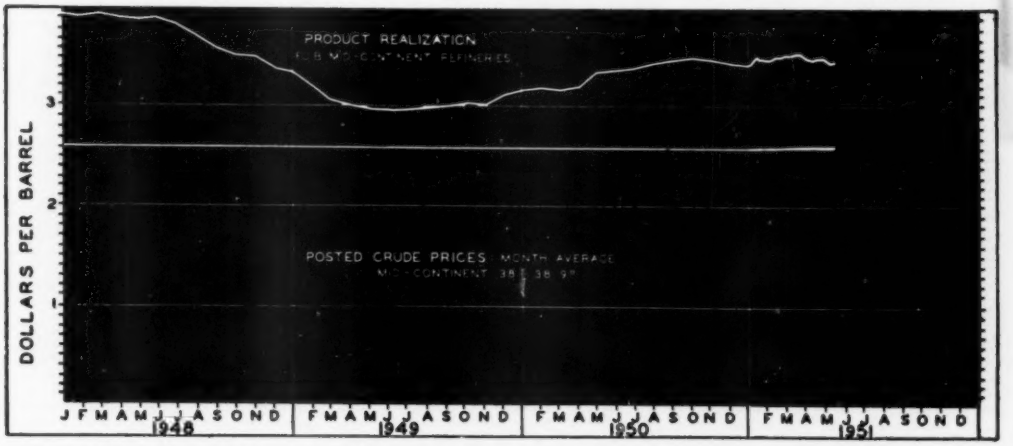
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

133-134 A.M.P.	6.0


PRODUCT REALIZATION
MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 | 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.47 for week ended May 19, $3.46 for previous week, and $3.37 for May 1950.

EQUIPMENT MEN . . . in the News

American Meter Announces Two Executive Appointments

W. G. HAMILTON

C. B. DUSHANE

William G. Hamilton was recently elected president of American Meter Co., and C. Benson Dushane, Jr., was appointed vice president in charge of sales.

Hamilton was first employed by Helme & McIlhenny, a subsidiary of American Meter, and in 1932 he was made sales engineer in Philadelphia, specializing in refinery and chemical-plant instruments. He was appointed manager of the Philadelphia factory in 1946, and in 1947 became vice president in charge of sales which position he held until his recent advancement.

Dushane joined the sales department of American Meter in 1920. Prior to his election as vice president he was manager of the Mid-West sales division, with offices in Chicago.

Pierce Buys Interest in Turner-Huffman Co.

Jay Pierce, Tulsa, has purchased an interest in Turner-Huffman Construction Co., Ponca City, Okla. This company specializes in pipe-line pumping-station construction, pipeline welding, and storage-tank repair work. Plans are being made to broaden the work to include gasoline-plant and refinery construction.

Pierce has been associated with the Walco Engineering & Construction Co. for the past 5 years, and prior to this was with Jones & Laughlin Supply Co. for a number of years.

The new organization will be known as Turner-Huffman-Pierce Construction Co.

New National Supply Store To Serve Burbank Field

National Supply Co. has announced the opening of an oil-field supply store at Shidler, Okla., to serve the huge Burbank field. The store's territory will include many adjacent areas where secondary-recovery activity is increasing steadily. Facilities for pump service and availability of pump parts will be emphasized.

Glenn L. Gordon, former National Supply field salesman at Hominy, Okla., will manage the Shidler store.

Jarecki International Announces Appointments

Jarecki International Supply Division, H. K. Porter Co., Inc., has announced that Charles L. White will be general manager of the expanded organization which now includes the former Ideco Supply stores as well as the Jarecki stores.

T. M. Evans, president of Porter, also listed in the announcement these other appointments within the division: John L. Morgan, former district manager for Ideco in Louisiana and Mississippi will be sales manager; F. W. Budde continues as assistant treasurer; J. A. Hadlow is works accountant; W. L. Reynolds, purchasing agent; E. H. Jaynes, credit manager; Don Shaw, manager, machinery sales; and F. E. Suder, manager of pumping-unit sales.

Valve Firm Appoints Goza Sales Manager

W. C. GOZA

Walter C. Goza, a veteran executive in industrial valve sales, has been named sales manager of D. T. Williams Valve Co., a division of The Schaible Co.

The announcement came from Michael Schaible, president, who said Goza's appointement is a major move towards expansion of the sales and production facilities of the 45-year-old Williams firm, which Schaible has owned and operated since 1949.

Goza was formerly associated with Pittsburgh Valve & Fittings Corp. for 18 years as general sales manager.

Cessna Announces Increase In Commercial Production

Don Flower, sales manager of Cessna Aircraft Co., has announced an increase in production on its 190 series, starting June 1.

The increased production will result in the delivery of approximately 33 per cent more 190 series for commercial use in the last half of 1951.

In addition Cessna will also produce its four-place model 170 for commercial use.

McCullough Tool Opens New Service Branch

McCullough Tool Co. has established a new service branch in Sterling, Colo., to provide faster service to oil operators in that area. The Rocky Mountain district office will remain in Casper, Wyo.

R. E. (Rusty) Hurst, formerly in the district office at Casper, has been appointed branch manager.

J. F. Baldwin Affiliates With Butler Industries

James F. Baldwin, former manager of Beaumont Iron Works, has become affiliated with Butler Indus-

J. F. BALDWIN

E. E. BUTLER

tries, Beaumont, Tex. Baldwin will join E. E. Butler in the company's new offices and mill depot.

The firm handles the sale and distribution of condenser tubes for Wolverine Tube Division in that area.

Canadian Westinghouse to Service Oil Rig Controls

Many drilling rigs in western Canada's fast developing oil fields are equipped with Westinghouse pneumatic controls that enable the driller to control many different operations from a central control panel.

In order to bring faster, direct service to drillers, Canadian Westinghouse Co., Ltd., Hamilton, Ont., has arranged to distribute and service these controls through its district offices in Halifax, N. S., Moncton, N. B., Montreal, P. Q., Toronto, Ont., Fort William, Ont., Winnipeg, Man., Regina, Sask., Edmonton, Alta., Calgary, Alta., and Vancouver, B. C.

Jefferson Promotes Innes

George L. Innes has recently been elevated to the position of assistant sales manager for Jefferson Chemical Co., Inc. Other changes in the sales department include the addition of John R. Carlson, who was formerly with Solvay sales division.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

CLASSIFIED ADVERTISING

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-4427.

FOR SALE: One drilling rig complete including 127′ Lee C. Moore mast and 7,200′ of 4½" drill pipe. Rig capacity 7,500 ft. Now operating in Oklahoma. All equipment A-1 mechanical condition. For further details and inspection write Box E-132, The Oil and Gas Journal, Tulsa, Oklahoma.

IMMEDIATE delivery complete workover Jack Knife Rig. Details and price on application. P. O. Box 3246, Corpus Christi, Tex.

FOR SALE: 4000 ft. 2⅜" Range 1 drill stem with Hughes Acme tool joints. Charles Clemens, Princeton, Indiana.

HOT BUY—8" COLLARS
28 lb. line pipe couplings at Dallas. Oilton Pipe & Supply Co., Oilton, Okla.

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: Failing 1500, Buda engine, 38 foot mast, mounted on 6x6 truck, complete with drill rod and accessories, operating and in good condition. H. W. Peerson Drilling Co., 1114 Seventh Avenue South, Birmingham, Alabama.

FOR SALE — Bucyrus - Erie Model 28-L Spudder, equipped with dual - tired semi-trailer mounting, casing tackle strut, tool crane, Waukesha gas-gasoline engine Model 6MZA. Machine complete with drilling tools, small tools, casing tools, good drilling, sand, and casing lines, flooring, section house, light plant, etc.—Price $15,000. Complete inventory furnished on request. J. W. Lang Co., 162 West 12th St., Holland, Michigan.

NEW A.P.I. COUPLINGS

1618 2" 10 Round Thread Non - Upset Tubing Couplings
50 5½" 10 V Thread Casing Couplings
96 7" 10 V Thread Casing Couplings
2 7" 8 Round Thread Casing Couplings
76 6⅝" 8 Round Thread Casing Couplings

Rock Island Oil & Refining Co., Inc.
321 West Douglas Wichita, Kansas

STEEL STORAGE TANKS

6—80,000 bbl. 117′ x 41′ 10″
6—55,00 bbl. 114′ 6″ x 30′ 5″
3—37,500 bbl. 95′ 5½″ x 30′ 4½″
3—25,000 bbl. 78′ x 29′ 4″

All steel cone roof, suitable re-erection Tanks standing location Texas Co.'s former refinery, West Dallas, Texas. Full particulars furnished on request.

ROGERS & WRIGHT, INC.
Wright Bldg., Tulsa, Oklahoma
Ph. 5-3229

MID-STATES PIPE & SUPPLY CO.
Box 2534, Tulsa, Oklahoma
Ph. 2-9128

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Two 6-cylinder Hydraulic casing pulling machines. One 7", 5", 3", seven foot jacks; one 5", 3", four foot jacks. Box E-128, The Oil and Gas Journal, Tulsa, Oklahoma.

CASING PULLING CONTRACTORS with Hydraulic Equipment: Experienced operators—Pull any size pipe, anywhere. Also will buy wells for salvage. GENERAL CASING PULLING CO., P.O. Box 4387, Oklahoma City. Phone 6-1335.

FOR SALE—Mayhew Model 2000′—1 Year old. A-1 Condition—mounted on International Tandem—5 x 8 G-D Pump—2000′ 2⅞" drill pipe, drill collars, core barrel, International winch truck, trailer mounted dog house, water tank, light plant, water pump, misc. tools; Rig now working in Oklahoma. Contracts available. Box E-113, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE, LEASE OR TRADE
Ideco rig, complete, good for 7,000 feet. Now in Canada. ORchard 1-3514, Inglewood, Calif.

NEW DRILL PIPE: 11,000 ft. string, new grade D 16.60 lb., range 3. Internal flush, external upset. Plain end for flash weld tool joints or can be shopped for casing use. Box E-129, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW PIPE
(Available Immediate Delivery)
5400′ 8" O.D. x 10 gage Electric Weld Pipe, 40′ lengths, plain ends. Tested 490# PSI. Located Compton, Calif.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128, Tulsa, Okla.

EQUIPMENT FOR SALE

PIPE
ALL SIZES: LINE PIPE AND CASING, TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO., PHONES 933 OR 1298, DRUMRIGHT, OKLA.

2—Identical Electric Machinery Manufacturing Company Generators, 60 KVA, 40 KW, 480V, 60 AMP, 1200 RPM, 3 Phase, 60 Cycle, each powered by a Buda Model L525 natural gas or gasoline engine and each cooled by a Young Happy Model 36 Full Flow Engine Jacket Water Cooler. Horsting Oil Company, P. O. 388, Driscoll, Texas.

FOR SALE: 20,000′ 4" o.d. 6 lb., seamless line pipe. Random lengths 30′ to 35′. This is number one used pipe. Clean, straight, beveled, ready to lay. Price 75c our yard. M. J. Regan, Coffeyville, Kans.

FOR SALE: Two 6-cylinder Hydraulic casing pulling machines. One 7", 5", 3", seven foot jacks; one 5", 3", four foot jacks. Box E-128, The Oil and Gas Journal, Tulsa, Oklahoma.

WAR SURPLUS EQUIPMENT
2½ to 25 Kw Light Plants, Byron Jackson Pump Units, Gaso Pump Units, Hale Fire Pump Units, Stewart-Warner Heater Units, Benson Portable Power Hoist, Victaulic Pipe Couplings & Fittings, Mobilift Fork-lift Trucks, New Wheatley 4" & 6" Gate Valves 500 WP. Write for listing—H. A. McCarthy, 310 Thompson Bldg., Tulsa, Oklahoma. 5-3296.

Casing—5½ and 7" No. 1 grade lapweld and seamless
Tubing—2, 2½ and 3" regular and upset
Water Well Casing—5⅝" and 6¼" attractively priced.

D. A. MORITZ CO.
9th & B&O, Braddock, Pa.

HIGH OCTANE UNIT

One complete U.O.P. Poly Unit with all equipment from the inlet to the compressor to the line to the run down tank—suitable for producing 150 barrels per day of 90 octane Poly gasoline.

This plant has operated two years on sweet gas in East Texas and has been replaced by similar equipment of much larger capacity due to plant increase.

It can be dismantled by us and moved to other foundations and placed in operation within ninety days under approval of U.O.P. It can be crated for export shipment from Houston, Texas, within sixty days. It will be necessary to sign a license agreement with U.O.P. before the plant is sold. Available for inspection at any time.

AMPCO
ENGINEERING & CONSTRUCTION CO.
Tower Petroleum Building **Dallas, Texas**

EQUIPMENT FOR SALE

EVERYTHING in Cable Drilling Tools, Rigs—Belts—Tanks—Engines. 25 Complete strings heavy tools. Tri State Tool & Supply Co., Box 827, Phone 7-5121, Parkersburg, W. Va.

FOR SALE: National 50 rotary drilling rig, NKU Waukesha engines, new Lee C. Moore 130′ 515,000# capacity mast with substructure, new 7¼ x 14 Gardner Denver pump, good drill pipe, everything complete and in first-class condition. H. Waggoner Drilling Co., Box 4657, Oklahoma City, Okla. Phone 64-1413.

FOR SALE: Approximately 760′ of 2⅜″ drill pipe, with API tool joints. Harry Moore, Phone 56 or 1138, Claremore, Oklahoma.

WILSON - TITAN draw works unit and compounding transmission on sub base with 40″ Parkersburg Hydromatic brake package, plain cathead drillers side, American Simplomatic break - out cathead opposite driller's side. A bargain at $4,000. Altus Drilling Co., Oklahoma City, 3-2331.

4—175 H.P. 185# W.P. Heine Water Tube Steam Boilers. Exceptionally good. Bourland Supply Co., Pampa, Texas.

FOR SALE: 2000 ft. new American Iron range 1 2⅞″ internal flush pipe with over size tool joints. Charles Clemens, Princeton, Indiana.

ONE CABOT T8UE-8DC pumping unit with counterweights less power unit. Used two years. Has 8,000 lb. polish rod rating. Garaton Service Co., Salem, W. Va.

FOR SALE: Bucyrus-Erie 36L Skid type Waukesha powered. Complete five and seven inch drilling tools, steel tool house, Kohler light plant, New ⅞ X 4500 Drilling line, ⅝ X 4500 sand line, ⅞ X 450 tubing line. Complete set rod and tubing tools, good timbers, and flooring, steel dump box, and steel tool rack. Rig is in A-1 shape and running at present time. Can give immediate delivery. Two Wilson rod and tubing units, single and double drum, with telescoping poles, complete with all tools and mounted on trucks. Crew cars to go with each unit. Both units fully equipped and in A-1 shape. Guss Irvin Well Servicing Co., Box 112, Stinnett, Texas. Phone #1.

1800 ft. 16″ OD 65# Used, J-55 8RT Seamless Casing R2. 1600 ft. 10¾″ OD 40.5# Used J-55 8RT Seamless Casing R2. 2500 ft. 10¾″ OD 8 ga. New Spiral Weld Surface Casing.

FRANK MORRIS & COMPANY
TUBULAR PRODUCTS
424 So. Cheyenne, Tulsa, Okla. 2-6247

SULLIVAN 200, mounted on Mack tandem truck, 45 foot mast, 5 X 8 Gardner-Denver pump. Rig powered by two Industrial 12 Chrysler engines 140 hp. each, vee belt drives, automatic chuck, hydraulic pull down, 26 foot Kelly, swivel, hoses, breakout tongs, and many other tools including about 1000 feet of drill pipe. Rig had $8000.00 in new parts put in it recently. Excellent condition. $15,000.00. Now operating in eastern Nebraska. Omaha Drilling Co., 624 Service Life Bldg., Omaha, Nebraska.

FOR SALE: Superior-General Electric natural gas engine-generating unit. 1-685 hp., 480 kw., 327 r.p.m., 480 v., 3-phase, 60-cycle. 1—510 hp., 350 kw., 400 r.p.m., 480 v., 3-phase, 60-cycle. Complete with exciters and generating panels. All in A-1 condition. Will consider selling engine separately. Max E. Landry, Inc., Tulsa, Oklahoma Phone 5-5639.

BUCYRUS 24 W, Waukesha engine, mounted on International 2½ ton truck. Drilling and fishing tools, cables. S. W. Pressey & Son, Pueblo, Colorado.

EXPLOSION PROOF MOTORS
1—20HP 1750 RPM 220-440 V 60 cycle
1—20 HP 860 RPM 220-440 V 60 cycle
Class 1 Group D Perfect Condition
2—25 HP GE Motor starters
2—Circuit Breaker Oil Switches
Box 2325—Phone 6-6850—Tulsa, Okla.

BIG SALE CABLE drilling and fitting tools. 25 complete strings. 75 stems. 100 bailers, 7—drilling motors 110 to 185 H.P. Hurry get your choice now. TRI STATE Supply Co., Box 827, Phone 7-5121, Parkersburg, W. Virginia.

2500 12¾″ O.D. Line pipe couplings, also 100 16″ O.D. NEW and Used, Reasonable. A. A. Gilbert Pipe & Supply Co., P. O. Box 986, Shreveport, La.

WELL EQUIPMENT: New and used spudders, rotaries, core drills — all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

2500 4½″ O.D. recessed steel couplings, 1,000 12¾″ O.D. recessed line pipe couplings, also 100 16″ O.D. line pipe couplings, all used but cleaned, reasonable. A. A. Gilbert Pipe & Supply Co., Shreveport, La.

Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3417—Houston, Texas

26″ O.D. STEEL PIPE

Approximately 6,000 ft. 26″ Steel Pipe .312 wall thickness, weight 85.73 lbs. per ft. Electric welded, used, lengths 40 to 50 ft., ends beveled. Recently recovered from a high pressure natural gas line, operated at 500# pressure. This is good pipe located in our Kansas City yard. Available immediate inspection and shipment.

CAST IRON GATE VALVES

We have just completed facilities and machine tools for reconditioning valves. Appr. 400 tons of all sizes from 3″ to 24″ Cast Iron Gate and Globe Valves, entirely rebuilt, tested and guaranteed. Now offered at great savings. Send us your inquiries and stock up while large range of sizes are still in stock.

CAST IRON PIPE

2,000′—24″—B&S 150 Class	288′—10″—B&S Class, 200
1,500′—18″—B&S 200 Class	625′— 8″—P.E. Class, 150
2,160′—14″—B&S 200 Class	123′— 8″—FLG Class, 150
454′—12″—B&S 200 Class	351′— 6″—P.E. Class, 150

Also large inventory of Cast Iron Fittings; Bell & Spigot type and Gate Valves. All Cast Iron Pipe recently removed from a water line and in good usable condition, located our Kansas City yards.

WRITE—WIRE—PHONE

BROWN-STRAUSS CORP.

1546 Guinotte. Phone HA. 1000 **Kansas City 10, Mo.**

EQUIPMENT WANTED

WANTED: Good used well drilling equipment. Spudders, rotaries, large or small. Tools and general equipment. We distribute throughout the West with hundreds of customers. Pressey & Son, Pueblo, Colorado.

WANTED: Wanted to buy complete drilling rig capable of 6,500′ depth. Sasko-Wainright Oil & Gas, Ltd., 305 Wallace Building, 9921-101A Avenue, Edmonton, Alberta, Canada.

40 SETS Tool Joints, first class condition, used Acme or API, for 2½″ drill stem, 8-thread regular. Sutter Well Works, P. O. Box 156, Pass Christian, Miss.

HELP WANTED

WANTED: Sales representative by old established pumping equipment manufacturer, liberal commission basis. Desirable territories open, all replies confidential. Box D-986, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED rotary driller, also cable tool driller on large water well work. Box E-116, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced finance man who has contacts with Capital oil investors. Have most unusual opportunity for good investment. Give full details in reply. Anglo-American Co-Operative Oil Co., 69 West Washington St., Chicago, Ill.

EXPERIENCED Engineer for Gas Lift Installation and Service Work. State Age, Experience and Salary Expected. Box E-151, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: PRODUCTION MAN capable of making drilling contracts, buying materials, completing wells, etc.—must be good. Box E-127, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Experienced oil field mechanic for gas engines, West Texas and New Mexico area. In field and shop. If interested, reply by letter to: Box E-123, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Young man with Crude Oil Purchasing experience — Gulf Coast Area preferred. Please give education, experience and salary expected in first letter. Box D-987, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Aggressive, well integrated strong independent company with comprehensive geophysical program desires geophysicist, 35 to 40 years old. Must have considerable experience, preferably with company background. Experience in Rocky Mountains, West Texas and Southwest Texas desirable. Duties consist mainly of supervision of contract crews and reanalysis of seismic data. Located in company headquarters but considerable traveling involved. Salary dependent on experience and ability. Write giving full details. Replies held strictly confidential. Box E-120, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOGRAPH OPERATOR
Major Company has openings for graduate electrical engineers experienced or interested in training as Seismograph Operator. Must be single and willing to accept future foreign assignment for two-year period in Venezuela, Colombia, Peru or Indonesia. Give full details of personal qualifications in first letter to Box E-140, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEER

To be located in Tulsa, Oklahoma, to work on projects in Petroleum and Pero-Chemical field. Operating experience desirable but not required.

Letter should include details of education, experience, family and military status, and salary expected. Personal interview can be arranged.

Chemical Plants Division

BLAW-KNOX CONSTRUCTION COMPANY

Box 1266 **Tulsa, Oklahoma**

HELP WANTED

WANTED: Geologist with approximately 4 years experience for employment by aggressive and expanding oil company. Headquarters Tulsa, Okla. Box E-141, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

MECHANICAL PETROLEUM ENGINEER

with 5 or more years experience
For Design of Oil Field Equipment

UNION TANK & SUPPLY CO.
P.O. Box 2092, Houston 1, Texas

Materials Supervisor Assistant

Required immediately by Oil Company in South America.

Must be thoroughly conversant with Office routine and the handling of correspondence, requisitions, purchase orders, shipping papers, etc., as applied to the Oil Industry. Age approximately 30-35 years.

Give full details of education and past experience to

Box E-147

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

CHEMICAL Engineer with experience in laboratory and process control. Maximum age 35. Send references, education, salary expected and snapshot in first letter. Location Western Canada. Box E-145, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Capable crude oil scout or assistant crude buyer for aggressive independent refiner. Good salary to right man who probably is in mid 30's. Able pipe line or land department scout may make grade. Petco Corporation, 425 Wilson Bldg., Dallas, Texas.

SITUATIONS WANTED

GRADUATE Petroleum and Natural Gas Engineer: 25 years old, single, non-reservist, interested in foreign employment, speak Arabic. Box E-119, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICS graduate, now working toward M.S. in geology at Tulsa University, desires afternoon work in Tulsa. Married, some field and office experience. Box E-152, The Oil and Gas Journal, Tulsa, Okla.

GEOLOGIST desires return to foreign employment. Total of 22 years foreign experience. Last 13 years in Latin America with major oil company; previous 9 in Near East. Box E-139, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

CIVIL ENGINEER and surveyor, graduate, several years experience oil industry. Will train. Box E-134, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: (B.S.), eight years' experience, desires responsible position Gulf Coast area.—Box E-130, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL
for
LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma

WANTED
Production Superintendent

Thoroughly experienced in the manufacture of oil field equipment, to supervise design, development and eventual production of oil well specialty items, i.e., bull plugs, swedge nipples, casing shoes, float collars, etc.

Must have executive ability and be able to assume complete charge of operations.

Write, stating experience, education, age, references. Applications held in strict confidence. Salary open.

Box E-153

The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

EXECUTIVE SECRETARY

offers exceptional training and experience to top-flight oil executive in Oklahoma or Texas. Have served as official court reporter and administrative assistant with supervisory experience. Able to handle correspondence and meet all kinds of people. Man, 35, single, two years college. For personal interview write Box 141, Bristow, Oklahoma.

MATERIAL CONTROL, Inventory, Purchasing and Liaison Executive Assistant. General knowledge of Production and Drilling. Available soon. Box E-128, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: 8 years experience in petroleum industry including pilot plant, process engineering and refinery operations. Experience with conventional refining units and fluid catalytic cracking. Location preferred: East Texas, Oklahoma or Kansas. Presently employed. Box E-155, The Oil and Gas Journal, Tulsa, Oklahoma.

CIVIL ENGINEER and surveyor, graduate, several years experience oil industry. Will train. Box E-134, The Oil and Gas Journal, Tulsa, Oklahoma.

TOOL PUSHER
20 Years Experience
Desires permanent employment with independent oil company. Box E-117, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT with years lumber experience wants connection in Spanish Speaking country. Have supervised dismantling, rebuilding and operating of logging, railroad and manufacturing operation employing 500 men. No military status. Box E-142, The Oil and Gas Journal, Tulsa, Oklahoma.

MARRIED Man, 34, no children, 15 years experience in Airplane Mechanics and Airline Inspection, would like position maintaining planes used in Oil Industry. Holds A and E and Radio-Phone license. Just completing 10 years at present position with Major Airline. E. A. Anderson, 6333 Ryan Ave. So., Minneapolis, Minn.

ENGINEER: Fifteen years experience drilling and production in Mid-Continent areas. Position must be available to schools. Excellent references. Personal interview write Box E-148, The Oil and Gas Journal, Tulsa, Okla.

I AM confident I could give proper representation, in the New York Metropolitan area to a couple of established manufacturers, for the Oil, Utility and Industrial field. At present employed as Sales Manager at a salary well in five figures and believe upon investigation you would find me well qualified. Box E-149, The Oil and Gas Journal, New York City, N. Y.

PETROLEUM ENGINEER
Eleven years varied experience with major oil company—Kansas, Oklahoma, Texas, New Mexico, Louisiana and Wyoming. Desire connection with established independent operator or sound small company. Presently employed in responsible position, prefer Tulsa location. Box E-150, The Oil and Gas Journal, Tulsa, Okla.

REAL ESTATE

MODERN well-planned homes in restricted district. Residential, commercial and industrial properties. Clem Casey, Bismarck, N. D.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

INDEPENDENT OPERATOR will buy producing royalties, over-rides, or settled production, small or large. Quick action. Box E-118, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCING ROYALTIES
WANTED
ANY AREA

BERN SECURITIES CO., INC.
111 Broadway New York 6, N. Y.
WOrth 4-7546

LEASE AND DRILLING BLOCKS

WE DESIRE to farm-out part or all of 28 drilling locations in proven area for good shallow production from four different sands in Smackover field. Block of acreage is reasonably near Buck Turner's new well (240 barrels, 42 gravity from 2935'). Farm-outs will require drilling to 3150' and will carry all deep rights. If interested contact us at once. Cobb Oil Co., 717 Pyramid Bldg., Little Rock, Ark. Tel. 2-4655, 3-1823.

OIL LEASE—185 acres near DeRidder, Louisiana Beauregard Parish encircled by Major Companies recent block. Interesting prospect to right party. A. Dickinson, Lake Arthur, Louisiana. Gen. Delivery.

WILL DEAL 6400 acres 10 year oil and gas leases. Located in 5 W.—19 S. of Sierra County, New Mexico. Altitude and Latitude comparable to Artesia pool. Near R. R. and Highway. No tests of importance ever drilled near. O. S. Fierbaugh, P. O. Box 1396, Albuquerque, New Mexico.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases. Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

PRODUCTION

Oil and gas producing leases of great merit that will stand the most rigid investigation. I now have several properties at prices ranging from $250,000 to $1,000,000. Will submit deals complete with geological and evaluation reports to qualified parties. Ideally set up for company financing. Correspondence of accredited investment houses invited. Fullest cooperation assured.

ARTHUR DAVIDOR
Oil Operator 35 yrs. experience
1412 N.W. 38th St., Oklahoma City, Okla.

FOR LEASE—
EASTERN NORTH DAKOTA

Undivided one-half interest in 130,000 acres, price 50c per acre bonus, 25c per acre annual delay rental, 1/8th of production, 10 year term. Will lease in County blocks or in total. Offered subject to prior sale.

Write or call **J. C. Hatfield, The Union Central Life Insurance Co., Box 177, Cincinnati, Ohio. Phone Dunbar 1880, Line 89.**

LEASE AND DRILLING BLOCKS

CHEAP Oil Acreage, Active Stands Investigation. Profits up to $200 per acre being made. New Fields, Ahead of Drill or Production. Small or Large Investments. References. E. M. Adams, Marshall, Texas.

FOR SALE: 640 acres Big Horn County, Wyoming (very hot); 20,000 acres in Central and Eastern Montana (scattered counties); 20,000 acres, North Dakota; 30,000 acres, South Dakota; 10,000 acres, Colorado; 30,000 acres, Nebraska (scattered counties). Prices and terms to properly interested parties. Dyer O.J. 1835 Champa St., Denver, Colorado.

BLOCK of 3,600 acres in New Mexico. Geological reports favorable. Correspondence invited from Parties interested in developing this acreage. Zeke Morse, 2525 So. Spaulding, Los Angeles, Calif.

FOR SALE: Two leases in Kansas. 264 acres. One on flood. Average daily production 16 bbls. Write Box E-154, The Oil and Gas Journal, Tulsa, Oklahoma.

KANSAS OIL DEALS WANTED: Reputable independent operator and producer solicits your drilling deals. Box D-974, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Have several nice leases in Shelby County, Texas. In Humble and other major Company blocks, lots of activity. Brokers invited. Write for information. C. A. Parker, Center, Texas.

6,500' 5½" 15.5 lb. J-55 Long T&C casing available for interest in producing oil or gas well. Box E-146, The Oil and Gas Journal, Tulsa, Oklahoma.

INCORPORATIONS

TEXAS-OKLAHOMA oil operators, organizing $10,000,000 corporation. Expect have as foundation settled production netting $1,000,000 yearly and pay dividends from beginning. Inquiries invited from principals or brokers desiring submit producing or wildcat leases, royalties, for sale, or in exchange for interest in Corporation with option executive position. No income tax payable until stock interest sold. Please submit properties, in strictest confidence, stating valuation. Post Office Box 24, Dallas, Tex.

OFFICE SPACE

AVAILABLE FOR LEASE: Centrally located office and commercial building, over 26,000 square feet, for long term lease. Steam plant. Parking available. C. B. Lynch, 303 South Cincinnati, Tulsa, Okla.

FOR SALE—MAPS

DENVER-JULESBURG BASIN
POMCO LEASE OWNERSHIP MAPS
Current, accurate, complete maps of Logan, Sedgwick, Phillips Counties, Colorado, now available with balance of Basin now being completed. Write for details to

PETROLEUM INFORMATION
208 Continental Oil Bldg., Denver

FOR RENT OFFICE SPACE

AVAILABLE FOR LEASE: Centrally located office and commercial building, over 26,000 square feet, for long term lease. Steam plant. Parking available. C. B. Lynch, 303 South Cincinnati, Tulsa, Okla.

SERVICES

METER CHART COMPUTING
by INTEGRATOR METHOD

All work supervised by experienced personnel.

SPECIAL CHART AUDITS

JOHN P. SQUIER COMPANY
Box 6100 Dallas, Texas

A.S.M.E. Program

TORONTO. — Various papers dealing with petroleum will be presented at the American Society of Mechanical Engineers' 1951 semiannual meeting at the Royal York Hotel here June 11-14.

They include: "Piping Flexibility Analysis by Model Tests," by Lale C. Andrews, M. W. Kellogg Co.; "Stress Conditions in Flanged Joints for Low Pressure Service," by Everett O. Waters, Yale University, and Frank S. G. Williams, Taylor Forge & Pipe Works; "Some Aspects of the Design and Economic Problems Involved in the Safe Disposal of Inflammable Vapors From Safety Relief Valves," by S. Chesler and B. W. Jesser, M. W. Kellogg Co.

"The Catalytic Effect of Several Metals on the Oxidation of Lubricating Oils," by David W. Sawyer, Aluminum Co. of America; "The Hydrodynamic Lubrication of Sector-Shaped Pads," by Ronald S. Brand, University of Connecticut; and "The Non-Steady State Load Supporting Capacity of Fluid Wedge Shaped Films," by Ernest K. Gatcombe, U. S. Naval Postgraduate School.

Canadian Fields

(Continued from page 158)

miles southeast of Calgary. It is one of the most complete sedimentary test wells so far drilled in the Calgary region, having been drilled through to granite after fully penetrating the Cretaceous, Paleozoic, and Devonian sections. Several tests were made during drilling and some encouragement was obtained.

Hales Oil & Gas Co. of Edmonton has indicated success according to unofficial reports on drill-stem tests run in the Lower Cretaceous at its initial venture in the Ellerslies area. First test reported gave a gas flow rate of 6,000,000 cu.ft. daily from 3,883-90 ft. Next test, from 3,890-95 ft., had a gas flow rate of 300,000 cut ft. daily plus pipe recovery of 540 ft. of oil. The well, Hales 1, in LSD 10, 32-51-24w4, is located ¾ mile northeast of South Edmonton 1, Cretaceous oil well, and 1¼ miles east of C.P.R.L.-Sllerslie 1, Cretaceous oil discovery in that area.

Imperial Oil, Ltd., has abandoned its Birtle 1, wildcat in southwest Manitoba, and is moving drilling rig for another exploratory venture about 22 miles west northwest of that wildcat. Birtle 1, in LSD 1, 27-17-26w1, completed drilling at 4,250 ft., after going to the granite without finding any indication of oil or gas. The company's next Manitoba well will be Imperial-Madeline 1, located on Crown land in LSD 16, 18-18-29w1, about 10 miles northwest of Lazare town and 50 miles northwest of California-Standard's Virden oil discovery.

CANADIAN SUCCESSFUL WILDCATS

Delhi-Union-Picardville 2, LSD 11, 6-59-26w4, TD 2,807 ft., capped, gas well.

H.B.-Union-North Tangent 1, LSD 16, 34-80-24w5, TD 3,274 ft., gas well.

CANADIAN WILDCAT FAILURES

Albercan-Spruce Grover 1, LSD 16, 25-52-27w4, TD 5,500 ft.

Seaboard-B.A.-Pacific - Fortune - Nestow 2, LSD 6, 8-60-23w4, TD 4,415 ft.

Socony-Gulf-Amerada-Wimborne 1, LSD 15, 11-34-26w4, TD 8,372 ft.

EASTERN CANADA

ONTARIO.—In Oxford County, Tri-County Gas & Oil Co., drilling on Jacob Stover farm, Concession 11, South Norwich Township, shot with 40 qt. of nitroglycerin at 1,085 ft. and developed a heavy gas flow. The company, holding some 3,000 acres in the area, drilled five previous holes (three fair gas wells) and a new field is indicated.

LEGAL

Notice is hereby given that SEALED BIDS will be received until 2:00 p.m. Mountain Time, 12 June, 1951 and opened at that time in the Office of the Superintendent of the Wind River Indian Agency, Fort Washakie, Wyoming, for the leasing of the following attached units of allotted and tribal lands, located in Fremont County, Wyoming, for oil and gas mining purposes. Unit No., Allotment No., description, and acreage follows: (1) Tribal, SW¼NW¼, N½SW¼, SE¼, SW¼, Sec. 14, SE¼ Sec. 15, NE¼NW¼, NE¼SE¼, S½SE¼, Sec. 22, NW¼, Sec. 23 T. 1 N. R. 1 W. (2) Tribal, E½SE¼, Sec. 23, N½NW¼, SE¼NW¼, Sec. 25, T. 1 N. R. 1 W. (3) Tribal, E½SW¼, Sec. 6, NE¼, Sec. 7, T. 1 S, R. 1 E. (4) Tribal, N½SW¼, NW¼SE¼, N½SW¼SE¼, Sec. 3, T. 1 S. R. 1 E. (5) Tribal, SE¼NE¼, Sec. 13, T. 1 S, R. 1 E, SW¼NW¼, Sec. 18, T. 1 S, R. 2 E. (6) Tribal, E½SE¼SW¼, Sec. 13, T. 1 S, R. 1 E. (7) Tribal, S½NW¼NE¼, S½SW¼NE¼, SE¼ NE¼, S½SW¼SW¼, E½SW¼, SE¼, Sec. 24, N½NE¼, Sec. 25, T. 1 S, R. 1 E. (8) Tribal, SE¼NE¼, NE¼SE¼, Sec. 36, T. 1 S, R. 1 E. (9) Tribal, S½S½, Sec. 19, N½, N½SE¼, Sec. 30, T. 1 S, R. 2 E. (10) 1903, SW¼SE¼, Sec. 25, 40 a. (11) 1904, SE¼SW¼, Sec. 25, 40 a. (12) 439, S½NE¼, N½SE¼, Sec. 26, 160 a. (13) 1910, SE¼SE¼, Sec. 26, NE¼NE¼, Sec. 35, 80 a. (14) 1907, W½SW¼SE¼, Sec. 26, 20 a. (15) 1908, E½SW¼SE¼, Sec. 26, 20 a. (16) 1901, S½NE¼, Sec. 25, 80 a. (17) 1905, S½NW¼, Sec. 25, 80 a. (18) 1899, N½ NW¼, Sec. 25, 80 a. (19) 1947, N½NW¼SW¼, Sec. 24, 20 a. (20) 1948, S½NW¼SW¼, Sec. 24, 20 a. (21) 1949, N½SW¼SW¼, Sec. 24, 20 a. (22) 1940, N½SW¼NE¼, Sec. 24, 20 a. (23) 1934, N½NW¼NE¼, Sec. 24, 20 a. (24) 1935, N½NE¼NE¼, Sec. 24, 20 a. (25) 1342, W½SE¼, Sec. 22, 80 a. (26) 1340, NE¼SE¼, Sec. 22, 40 a. (27) 1341, SE¼SE¼, Sec. 22, 40 a. (28) 300, S½NW¼, Sec. 16, 80 a. (29) 1371, SW¼NE¼, Sec. 16, 40 a. (30) 139, NW¼ SE¼, Sec. 16, 40 a. (31) 1449, W½SW¼SW¼, Sec. 13, 20 a. (32) 1437, E½SW¼SW¼, Sec. 13, 20 a. (33) 1450, W½SE¼SW¼, Sec. 13, 20 a. (34) 1334, NW¼SW¼, Sec. 13, 40 a. (35) 1317, NE¼SW¼, SE¼NW¼, Sec. 13, 80 a. (36) 1813, NW¼NE¼, Sec. 13, 40 a. (37) 1181, NE¼NE¼, Sec. 13, 40 a. (38) 1934, N½SE¼, Sec. 13, 80 a. (39) 1925, E½SW¼SE¼, Sec. 13, 20 a. (40) 2096, N½SE¼SE¼, Sec. 13, 20 a. (41) 2097, S½SE¼SE¼, Sec. 13, 20 a. (42) 1924, W½SW¼SE¼, Sec. 13, 20 a. (43) 1316, NE¼NW¼, Sec. 13, SE¼SW¼, Sec. 12, 80 a. (44) 1315, SW¼SE¼, Sec. 12, 40 a. (45) 1282, NW¼SE¼, Sec. 12, 40 a. (46) 1313, N½NW¼, Sec. 12, 80 a. (47) 1394, S½NW¼, Sec. 12, 80 a. (48) 1327, SE¼SE¼, Sec. 11, 40 a. (49) 1327, SW¼SE¼, Sec. 11, 40 a. (50) 1326, N½SE¼, Sec. 11, 80 a. (51) 1321, W½NE¼, Sec. 11, 80 a. (52) 1325, E½SW¼, Sec. 11, 80 a. (53) 1324, W½SW¼, Sec. 11, 80 a. (54) 1322, E½ NW¼, Sec. 11, 80 a. (55) 1320, W½SW¼SE¼ NE¼, Sec. 11, 5 a. (56) 1320, W½NW¼SE¼ NE¼, W½W½NE¼NE¼, Sec. 11, 15 a. (57) 1320, E½SE¼NE¼, E½W½SE¼NE¼, E½ NE¼NE¼, E½W½NE¼NE¼, Sec. 11, 60 a. (58) 1357, S½SW¼, Sec. 10, 80 a. (59) 1358, SE¼SE¼, Sec. 10, 40 a. 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(84) 1402, SE¼ NE¼, Sec. 26, SW¼NW¼, Sec. 25, 80 a. (85) 1401, SE¼SW¼, SW¼SE¼, Sec. 25, 80 a. (86) 1397, SE¼NE¼, NE¼SE¼, Sec. 36, T. 1 N, R. 1 W, W.R.M., 80 a. Total Tribal Lands, 2,382.90 a. Total Allot. Land, 3,920.23 a. Total Tribal and Allot. Lands, 6,303.13 a. more or less as Surveyed. The successful bidder must prepare the leases for such tract on Departmental Form 5-154h and must obtain the signatures of the owners on each of the allotments. The lease will be sold to the highest bidder for a bonus offer upon an acreage basis in addition to the royalty of 12½% and rentals of $1.25 per acre per annum. The successful bidder must deposit with the Superintendent of the Wind River Indian Agency, on the date of the sale, a certified check or bank draft on a solvent bank in an amount equal to 20% of the bonus bid and of the first year's rental of $1.25 per acre, as a guaranty of good faith. The check is to be made payable to the TREASURER OF THE UNITED STATES. The lease must be completed and filed with the Superintendent within 20 days from the date it is received by the lessee for execution and returned with the remainder of the bonus bid, the balance of the first year's rental, a filing fee of $10.00, and the cost of the printed forms. Failure in any of these conditions may subject the bid to cancellation without further notice and forfeiture of payments already made. The right is reserved to reject any and all bids and to disapprove and reject prior to approval any lease made on an accepted bid; and should any bid be rejected or lease disapproved through no fault of the bidder all deposits made, except the cost of advertising this lease sale shall be returned to the bidder. The sale will be conducted pursuant to the Act of March 3, 1909 (35 Stat. 781-783) and the applicable regulations, 25 CFR, 189 and pursuant to the Act of May 11, 1938 (52-Stat. 347) and the regulations Pt. 186, Title 25, CFR. The lessee must furnish a satisfactory surety bond for each lease as required by the regulations, or a lessee may file one bond (Form 5-154f) in the sum of $15,000 to cover all of the land. The responsibility of complying with the requirements of the Federal Documentary Stamp Statutes will be left with the successful bidder. The adequacy of the bonus bid will be considered by the United States Geological Survey. All bids should be addressed to the "Superintendent, Wind River Indian Agency, Fort Washakie, Wyoming" in a plain envelope marked: BID FOR OIL AND GAS MINING LEASE, MC GOWN ANTICLINE & SAGE CREEK STRUCTURE, TO BE OPENED AT 2:00 p.m., Mountain Time, 12 June, 1951. For further information call or write Lands Department of the Wind River Agency. Lynn W. Jenkins, Land Officer.

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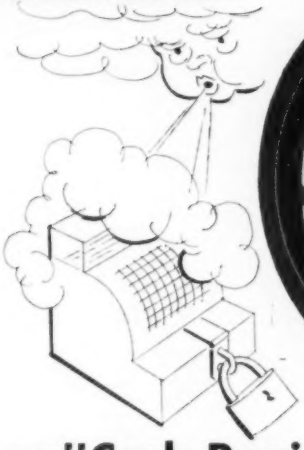

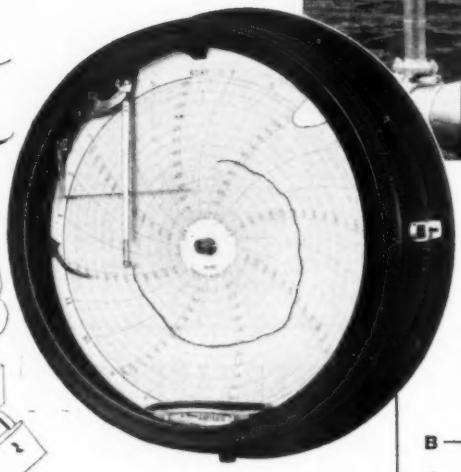

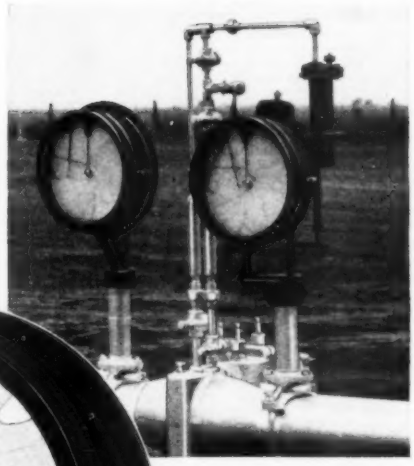

***Above** — Foxboro Anti-Ambi Recorder and Foxboro Flow Meter.*

***Left**—The Anti-Ambi Recorder*

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You can be sure you're ringing up your full money's worth of *actual* gas volume — regardless of weather ups and downs — when you have the protection offered by Foxboro Anti-Ambi Temperature Recorders.

In orifice-type metering, a variation of only 10 F. in gas temperature will cause an error of 1% in metered volume, unless corrected. And that means substantial losses over a prolonged period. With Foxboro Anti-Ambi Temperature Recorders you get continuous, accurate records, permitting full correction for temperature variations and precise computation of gas delivery in standard volume units.

The Anti-Ambi Recorder has the ruggedness and accuracy typical of Foxboro Instruments. Weather-tight case permits installation out-of-doors. Fully compensated for ambient temperature changes. These are some of the reasons why the gas industry uses more Foxboro Anti-Ambi Temperature Recorders than all others combined.

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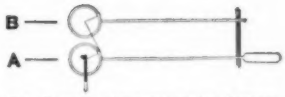

The diagram above shows the Foxboro automatic compensation for ambient temperatures. Measuring and compensating elements are located in the same case, and capillaries for both systems are in the same protective tubing. The compensating system automatically resets the primary measuring system to correct for ambient temperature changes. Instrument and compensation are calibrated at same time.

Here's the small-diameter, quick-response bulb used with the Foxboro Anti-Ambi Thermometer. Bulb is made with a stainless steel neck to reduce conduction effects.

The bulb is generally protected by the special socket shown above. It has aluminum fins for rapid heat transfer, and a stainless steel extension to minimize heat conduction to the socket head.

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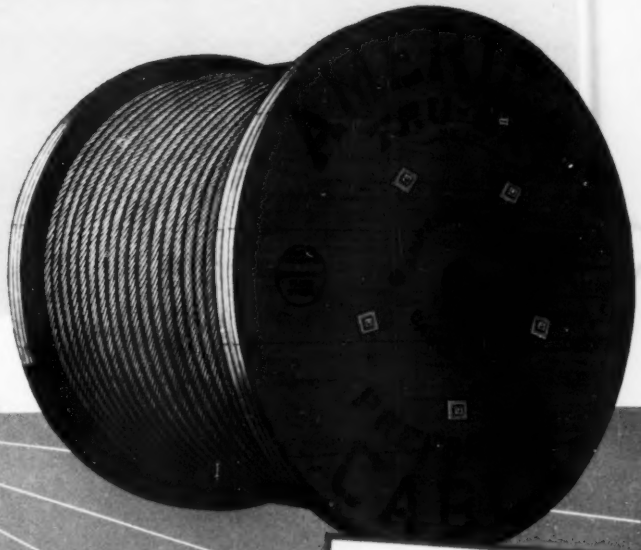

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